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30x5.00-20	2.10	1.05
28x5.25-18	2.10	1.15
29x5.25-19	2.15	1.15
30x5.25-20	2.15	1.15
31x5.25-21	2.45	1.15
28x5.50-18	2.45	1.15
29x5.50-19	2.45	1.15
30x6.00-18	2.65	1.15
21x6.00-19	2.65	1.15
22x6.00-20	2.65	1.25
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33x4½	2.55	1.15
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SEPTEMBER
1934

MODERN MECHANIX AND INVENTIONS

Volume XII
Number 5

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Editor

A. Neely Hall
Workshop Expert

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Robert Page Lincoln
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S. S. Rabl
Naval Architect

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( ) Customs Inspector ..... ($2,100 - $3,300)

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Address.....

Use This Coupon Before You Mislay It

We present here interesting M-M reader letters and our answers.

USES FOR OLD AUTO PARTS

I would suggest giving more space to the highlights of M-M—the Editor's Workbench, Problems, Radio Sparks, and Auto Kinks. Most of us can get auto parts galore—why not have a page in each issue telling how to make use of these parts?—C. W. H., Kokomo, Ind.

Letters such as the above are of great value in planning future issues of M-M. We are always on the lookout for new uses for old auto parts, and will pay our regular rates for any acceptable ideas sent in by readers. Rough sketches should always be included with the descriptions.

FROG FARMING

I was very much interested in your article on "backyard frog farming." I'm a frog farmer myself, and am now selling what I believe to be the first crop of Louisiana bullfrogs ever raised in this part of California.

Water is scarce here, but I am lucky enough to have 3 acres of marsh and some 3 acres of ponds.

I use a mechanical bug catcher that knocks insects by the bushel into the concentration pools with their wings wet—alive and kicking—just the sort of thing that frogs like best. The bugs are attracted by a powerful electric light, and then blown into the mouth of a large funnel and down through a pipe into the pool by an electric fan. —J. E. H., Alhambra, Cal.

J.E.H. has studied frog farming and water farming in general for years. Questions on these subjects will be forwarded to him if stamps are enclosed.

LIGHTING GENERATOR FOR BICYCLE

Is it possible to obtain a small generator which can be driven from a bicycle wheel to supply sufficient current for a spotlight?—R. W. J., Omaha, Nebraska.

Many of the toy direct current motors will work very nicely as generators if driven at a high enough speed. Try mounting different motors on the front fork of your bicycle in the same manner as sirens are mounted. Run wires from the generator brushes to your light bulb.

COPYRIGHTS ON ARTICLES

Am I infringing on any patents or copyrights if I sell things which I make from plans appearing in M-M?—A.L.C., Brookville, Pa.

All material in MODERN MECHANIX AND INVENTIONS is copyrighted, but only to prevent other persons or publications from reprinting any of it without our permission. We want our readers to make just as many articles from our plans as they possibly can; we have no objections at all to the selling of any of these articles.

CAKEPAN RADIO TRANSMITTER

Please tell me how I can hook up an aerial to the cakepan transmitter in the July issue to transmit up to 25 miles.—K.W.O., Amery, Wisc.

This radio set was intended to be used *only* as a novel means of broadcasting within the home, and *not* for actual transmission over any distance. An amateur's license would be needed, and coils used which would bring the transmitter into one of the "ham" bands.

There are many much more efficient transmitters that can be built for the amateur bands. Information on their construction is given in several of the radio amateur's handbooks listed in the new M-M blueprint book.

HEAT PROBLEMS IN THE STRATOSPHERE

Why is it colder in the stratosphere than near the earth, even though this region is closer to the sun?—C.V.J., Wheeling, Va.

In the stratosphere high above the earth's atmosphere there are few air molecules upon which energy radiated from the sun can be dissipated. Near the earth a great deal of the sun's energy is expended in heating our atmosphere—that which goes through to strike the earth's surface is either absorbed or reflected back again. The atmosphere is therefore warmest near the earth where it is densest.

(Editor's Note—All letters sent to this department should include a stamped addressed envelope. Write to M-M Problems Editor, 539 So. 7th St., Minneapolis, Minn.)

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FOR A

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IN THE

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Aviation Is Growing Fast

Get into Aviation now—when you are still getting in on the ground floor of a new industry—when you have a chance to forge ahead without having to displace lots of older men. Aviation is a young man's industry, where young men earn real money. The President of the biggest air line in the World is only 35 years old. Most famous pilots are in their early thirties, or even younger. It is a young man's industry, which means that there are plenty of opportunities to forge ahead. But just because it is run by young men, don't get the idea that Aviation is a small business. Millions are being spent yearly to develop and improve airways and planes. Thousands of men earn good livings from the business. And many, many thousands will enter it in the future. It is a great and growing industry, this Aviation, an industry that still brings romance, excitement, thrills—even while it is bringing big opportunities and good pay.

Here are just a few of the many well-paid jobs in the fast growing Aviation Industry:

ON THE GROUND

Airport Superintendent
Instrument Specialist
Electrician
Shop Foreman
Hangar Crew Chief
Traffic Manager
Purchasing Agent
Aerial Mail Clerk
Motor Expert
Radio Operator
Airplane Mechanic
Field Work

IN THE AIR

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Air Mail Pilot
Aerial Photography
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Private Piloting
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Flight Instructor
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Field Manager
Transport Pilot

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Due to my widespread connections with aviators, plane manufacturers, airport managers, etc., I am in an especially favorable position to locate jobs for trained men. My Aviation friends know that Hinton-trained men are well qualified to fill any job for which I recommend them.

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Aviation Institute of U. S. A., Inc.
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Name .....
(Print clearly)

Address .....Age....

City .....State.....

Chips from the

Boats and automobiles continue to hold the interest of MM's workshop fans and bring them cash awards for novel handicraft. Read details of photo prize contest.

Here is "Sea Duck," Dr. Clarence Slack's version of MM's "Dorothy." Photo took third prize in this month's contest.

JUST as a reminder and a helpful tip—cold winter winds are gathering force up north and the fellows who come through with the best winter photographs will be the ones winning the prizes in our monthly contests. Send in your last year shots now of your ice boats, sleds, and other wintry "how to builds."

Three prizes are awarded every month for the best photographs submitted to this department. They are: first prize $5.00, second $3.00, and third $2.00. Don't forget to send a brief, but interesting letter along. Address entries to The Editor's Workbench, Modern Mechanix and Inventions, 529 So. Seventh St., Minneapolis, Minn.

* * *

The photo of the novel streamlined car, built by Fred C. Gehrke, of North Judson, Ind., brought him first prize of $5.00 this month. He calls it a "puddle jumper" and says:

North Judson, Ind.

Dear Editor:

Am sending you a couple of pictures of my new puddle jumper. It is powered with a twin cylinder motorcycle engine, has three speeds forward and reverse, is a front wheel drive and has rear wheel steering. It has airplane wheels on a Ford rear end; seats two or three people and can do about 60 miles an hour and 30 miles on a gallon of gas.

Fred C. Gehrke.

We venture to predict that Gehrke's model is the "car of the future."

* * *

John Prokap, of Company E, First Engineers, built a body for his Buick, sent us a photograph, and walked off with second prize of $3.00. His letter tells us:

Fort Du Pont, Del.

Dear Editor:

I am sending a picture of the sport roadster I built from an old Buick. Your magazine certainly helped me a lot in building it.

It is a great magazine for everybody from 7 to 70. It helped me to make a sport plane four years ago, plans for which were published in your magazine.

My Company is also getting MM but there are 85 men in the company and it's a long time before a guy gets it, so I buy my own. I am also building a one-place monoplane but it's in the early stages as yet.

John Prokap.

* * *

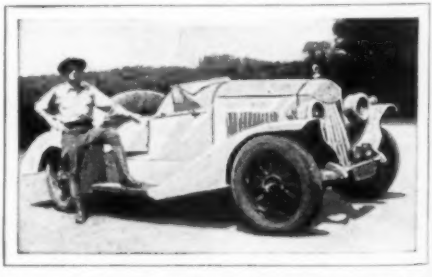
Clarence Slack's version of MM's cruiser *Dorothy* brought down third prize of $2.00 in the Workbench's monthly distribution of cash. Here is his letter:

Trenton, N. J.

Dear Editor:

"Sea Duck" is the name of my boat built from the plans of "Dorothy" which you published. She is an auxiliary cruiser modernized by John G. Hanna from a well tried cruiser by the name of "Roamer."

"Sea Duck" has well lived up to both names because in far too short a summer she has made one cruise of about 200 miles, most of which was at sea. She has traveled from end to end of Barnegat Bay and has made many blue fishing trips, ten to 25 miles off shore. On one occasion, after 25 miles or so, we



This sport body was built by John Prokap on an old Buick. The interesting photo was awarded second prize this month.

editor's Workbench

found it too rough to hold our fishing rods, but the little boat safely brought us back and poked her nose in the quiet water back of the inlet.

Dr. Clarence J. Slack.

* * *

Two more clubs have been granted charters in the International Society of Modern Mechanix and Inventors. One is the Greater Detroit Artisans Outlook club with Stephen Prohaska as president.

The San Bruno Crafts Club of San Bruno, Calif., is also interested in the same type of activities. Marvin D. Grush is president of the organization.

The following letter of advice of organizing successful clubs was received from David S. Forsyth, commodore of the HI-N-DRI Yacht Club:

Los Angeles, Calif.

Dear Editor:

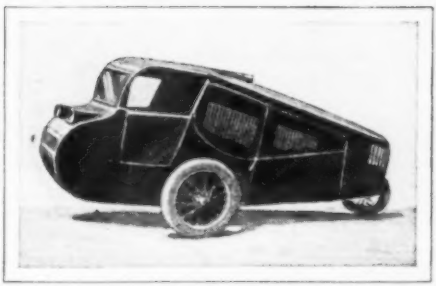
The success of any club depends first upon the officers and second upon the members. Pick, if possible, officers that are not afraid to work or put out once in a whole. In fact, our officers stood the entire cost of parties, meetings and correspondence the first year.

Our members are all hand picked from the applicants by the board of governors. By this method we seldom get a member who isn't congenial and interested in boats. We always serve refreshments of some sort and we try to have a guest speaker at meetings.

David S. Forsyth.

* * *

Light plane fans throughout the country are fighting the entangling web of red tape, laws, and restrictions that is holding them to the ground. In Minnesota B. H. Pietenpol and others have organized the Minnesota Aviation Association for promotion and protection of amateur and private flying.



A three-wheeled streamlined car was designed by Fred C. Gehrke. The result of his work is shown in the photo above, which won $5.00 first prize in the Workbench contest.

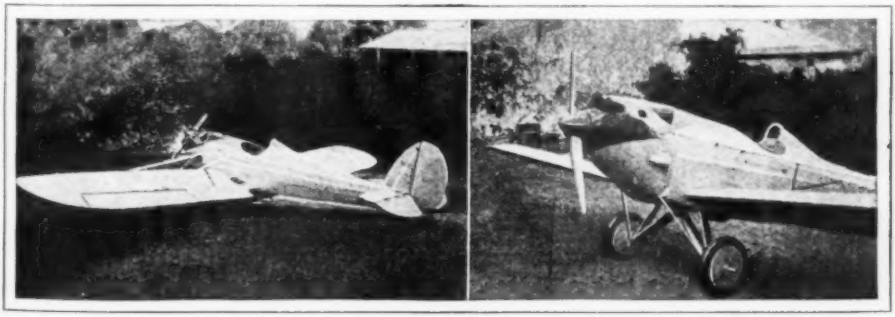
Iowa has also clamped down on the light plane boys and H. D. Barton, of Des Moines, is appealing to fellow amateurs to protest.

A letter from R. Waller, of Chicago, includes this information from the U. S. Department of Commerce:

It is necessary that each person constructing an airplane comply with the Airworthiness Requirements. The original designer and manufacturer must fully comply with the airworthiness requirements and obtain an approved type certificate for the particular airplane involved. The person other than the original designer must construct his airplane in exact accordance with the approved drawings and instructions furnished by the original designer and submit an affidavit to that effect.

A Department Representative will inspect each home built airplane for workmanship, material and conformity before the covering operation. Another inspection and a flight test will be conducted after the covering. Upon satisfactory completion of these inspections and flight tests a license will be issued.

MM is always glad to get news from light plane fans. Let's hear what you are doing.



This is the second home-built plane constructed by G. T. Belcher, of Honolulu. The first was a Heath Parasol. Belcher drew his own plans for the ship shown above. It has a fuselage of steel tubing and a Heath B-4 motor.

LEARN RADIO

HERE THEY ARE:
Dr. C. M. Blackburn, Chief Radio Engineer, Colgate-Crosley Combined (Majestic).
Randall Clough, Chief Engineer Clough-Brengle Co. (Radio Engineers and Manufacturers)
Burt Hamel, Chief Engineer, Zenith Radio Corporation.
Dinsmore Hoxie, Gen. Manager, Radio Station KYW, Chicago.
B. MacGregor, Service Manager and Sales Engineer, Transformer Corporation of America (Chicago).
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A four-clawed flexible steel finger which grips and holds anything from a pin to a 9/16" nut. Starts cotter keys, nuts, bolts, screws and rivets where human fingers cannot reach—around corners, over and under obstructions. Fishes out parts dropped in crank case or radio chassis. Flexo-Grip will save two dollars worth of time and five dollars worth of temper for electricians, carpenters, plumbers, garages and mechanics in every field. Price one dollar postpaid.

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A Complete Line of Motor-Driven Woodworking Tools!

"Delta" Woodworking Units are convenient, portable and compact. All are available in a large variety of combinations and at prices to fit all needs. The "Delta" line includes: **Jointers, Band Saws, Scroll Saws, Circular Saws, Woodturning Lathes, Drill Presses, Boring, Routing, Sanding, and Mortising Attachments—and a full line of accessories.**

You'll be astonished at the remarkably low price of this fine quality tool — one-third of the price at which machines of this calibre were offered.

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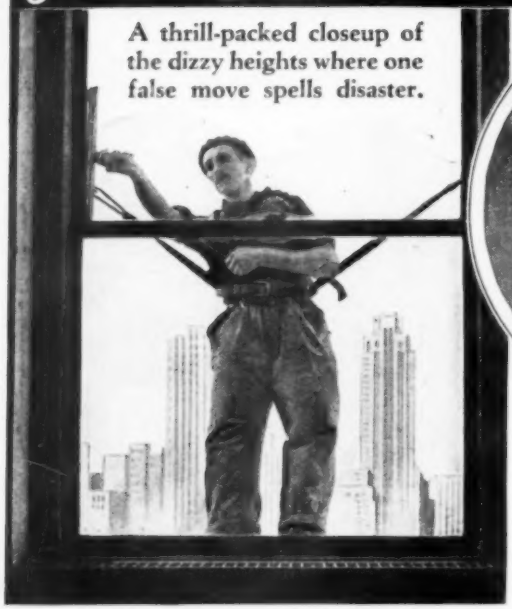
City ..... State .....

How a Skyscraper Window

A thrill-packed closeup of the dizzy heights where one false move spells disaster.



Above, Richard Hart, chief of the window brigade of the Empire State Building, who paints the thrills and dangers of his hazardous profession in this vivid, gripping story.

by **FRED A. BELL**

HAILED as supermen, stunt artists are paid fabulous sums to risk their necks for a thrill-hungry public; yet their most hair-raising feats are duplicated every day by the daring men who clean the windows of the nation's towering skyscrapers.

Perched at dizzy heights on window ledges barely wide enough to afford a toe-hold, the aces of the window brigade put circus acrobats and parachute jumpers to shame. For there is no margin of error—no nets or parachutes to break a possible fall. An error in judgment, a slip of the life belt and the window cleaner has signed his own death warrant. Below him there is nothing but a yawning city canyon—a square of concrete pavement to land and die on.

One of the men best qualified to paint the thrills and dangers of this hazardous profession is Richart Hart, chief of the window polishing squad of the Empire State Building, the tallest structure ever reared by man.

Above, in circle—Window cleaner is shown attaching life belt to hook anchored in wall before swinging out on the ledge. Below—Worker's total weight is supported by this belt. A steel brace in back prevents the belt from slipping.

Hart spent ten years mining coal in the Pennsylvania coal fields before he decided he wanted an open air job such as window cleaning. Down at Wilkes-Barre he tunneled for coal as far as 2,000 feet into the bowels of the earth. Now he thinks nothing of cleaning glass at 1,250 feet, which is the tip of the Empire State Building.

"Working with a hand-pick and shovel in the depths of the coal mines," Hart says, "was a snap compared to brushing up a window pane on the 85th floor of the Empire State Building.

"Every morning when you went down the shaft for another day in the mine, you just resigned yourself to Fate, and if the

CONSTANT PERIL STALKS DAREDEVILS ON

Washer Faces Death

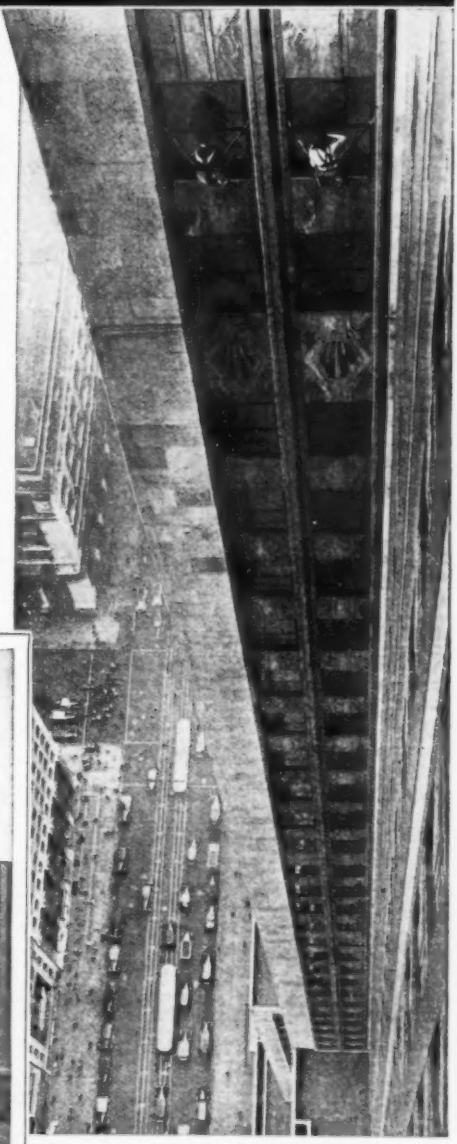
heaviside layer of coal and rock was going to crumble over you that day, well, you figured there was nothing you could do about it anyway. It was just bound to happen.

"Now with the sparrows—that's what they nickname us because we can perch anywhere—it's different. You can be the master of your own fate by being careful and alert. There's no reason for feeling it's the end every day.

"We have our own window cleaning department in the Empire State Building. Three years ago I had close to fifty men under me; but it's been a case of the survival of the fittest, until today I have just eight. But they don't come any better. They're hand-picked men and crackerjacks at their trade. I don't mean that their former comrades have kicked the bucket. They've just wandered off to other jobs where the knees don't get jittery from prancing around at dizzy heights.

"Last year one of my best window-cleaners decided to quit. He was 65 years old, had been in the business 41 years and wanted a

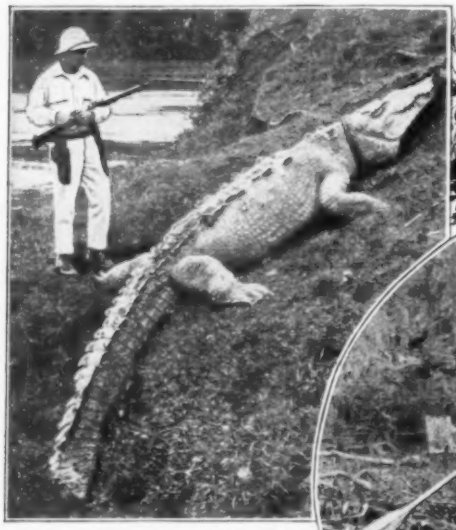
(Continued on page 128)



Above—Two members of the Empire State crew are shown at their dizzy task. A single error in judgment here means a horrible fall. Left—Note the width of the ledge to which the worker must cling.

WINDOW LEDGES OF EMPIRE STATE BUILDING

Jungle Canals Open New "Croc" Territory



A Canal Zone crocodile hunter and a specimen of his kill. Construction of "mosquito canals" permits hunters to enter unexplored alligator and crocodile haunts. Skins of reptiles bring high prices from leather novelty manufacturers.

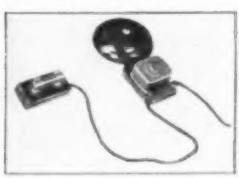
Photo of Canal Zone "mosquito canal," dug by government to drain areas where malaria mosquitoes breed. Canals are just large enough for outboard boats of "croc" hunters.

A VAST network of small ditches or "mosquito canals," recently run through swampy areas of the Panama Canal zone by the government, have unintentionally become of untold benefit to a group of men who earn their living as crocodile hunters.

These swampy areas, formerly impassable because of the density of tropical jungle vegetation, are the haunts of innumerable crocodiles and alligators as well as mosquitoes.

The mosquito canals are five feet wide and about four feet deep—more than large enough to permit the passage of canoes and outboard powered boats. Hunters can now penetrate many a new "saurian heaven."

Tiny Fire Alarm Rings Door Bell



Tiny fuse at left acts as fire alarm, melting when temperature rises above 130 deg. F. to close switch, ring door bell.

A TINY fuse that melts at 130° F. to close an electrical contact and ring the house door bell is now being marketed as the world's smallest fire alarm. Two wires run from the fuse to the bell switch terminals.

Kitchen Kit Has Seven Gadgets

SEVEN of the most often needed kitchen necessities are at the finger tips of the housewife having the latest combination cook's kit on her kitchen wall.

The container, which is pressed out of sheet metal and finished in white enamel, has mounting lugs on the back. Extra paper pads and calendars can be obtained.

New kitchen kit contains, left to right, memorandum pad, calendar, room thermometer, hour glass type egg timer, cooking timer, reel for grocery string (in back), and roll of waxed paper (in back). Entire unit hangs on kitchen wall.

English Youths Build Smallest Cabin Cruiser in the World

WHAT is believed to be the smallest cabin cruiser in the world has recently been put in commission on the Thames river, England.

Powered by an outboard motor which turns up four horsepower, the midget craft attains a rate of speed which evokes comment wherever it makes an appearance.

Built in a home workshop, the boat is scarcely larger than an over-sized washtub. The tiny cockpit is just large enough to accommodate two adults who must ride elbow to elbow.

The diminutive craft is completely equipped with regulation running lights; and a short mast makes provision for the installation of a radio aerial.

Barely large enough to seat two adults in its tiny cockpit, this home-made, English cabin cruiser, powered by an outboard motor, is attracting wide attention on the Thames.

Blow Torch Destroys Weed Pests

Photo shows improved blow torch used to destroy weed pests. Torch burns heating oil at rate of only one gallon for each hour of operation.

HOURS of back-breaking labor are now eliminated with a new device which destroys weed pests by means of controlled fire.

By enlarging a blow torch and placing it on a convenient handle, a Brooklyn concern has evolved a weed destroyer which can be used around buildings without danger of starting a fire. The device has the added advantage of enabling the operator to burn the weeds while they are still green, preventing regrowth.

Chemical Unit Smothers Fires

Closeup of chemical unit which smothers fires with gas blanket.

FIRE hazards are reduced to a minimum with a new automatic chemical sprinkler system which smothers the flames under a blanket of gas.

Heat melts the solder of the sprinkler head, releasing a chemical spray. This blanket dilutes oxygen in area, quickly extinguishing fire.

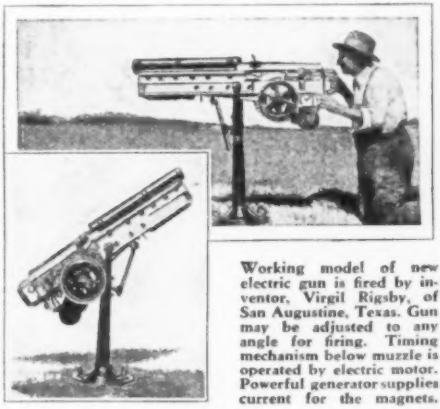
Scientists Test Banana Powder

FUTURE banana shipments may reach the corner grocery in cans instead of in bunches. Experts of the national Food Research Division have approved a process which reduces water content of the fruit, and changes it to powder.

Texan Builds Novel Electric Gun

GIANT projectiles pulled at terrific velocities through powderless cannon by magnetism, leaving the barrel with scarcely more noise than that made by a .22 rifle, may set new problems for range finders.

The electric gun invented and patented by Virgil Rigsby of San Augustine, Texas, is similar to an electric motor with the field poles unrolled. Powerful magnet coils mounted end to end along the barrel of the gun are supplied with electricity by an electrical timing switch in such fashion that the magnetic pulling force is always ahead of the projectile.



Working model of new electric gun is fired by inventor, Virgil Rigsby, of San Augustine, Texas. Gun may be adjusted to any angle for firing. Timing mechanism below muzzle is operated by electric motor. Powerful generator supplies current for the magnets.

Synthetic Chemical Tires May Supplant Natural Rubber

Two bathing beauties inspect the synthetic rubber tire made from coal, limestone, salt and water which may soon be used to make suits like that worn by the girl at left.

Salt Ice Cools Products to Zero

SALT ice, thirty degrees colder than ordinary ice, is a new refrigerating substance recently perfected by chemists. Composed of one-fourth salt and three-fourths ice, it is made either in blocks or chips and is said to have kept contents of an ice cream truck at zero temperatures on the hottest days.

Cutting Tool Uses Razor Blades

Photo shows closeup of handy cutting tool, using razor blades.

AN efficient scraper and cutting or ripping tool utilizes two-edged razor blades held rigidly in a new type of holder. A set screw holds blade securely in any one of three positions. Any blade may be used with the holder, although special blades, to be stored in hollow handle of the device, are available.

SYNTHETIC rubber, long the dream of scientists, is now an accomplished fact with the introduction of auto tires which have proven the equal of natural rubber in recent tests.

Perfection of the new tires is hailed as a possible curb on excessive prices and as a guarantee of American rubber independence in time of war. Among the ingredients used in manufacture of the synthetic rubber are coal, limestone, salt and water —materials all found in abundance in the United States.

The new synthetic material has been found to be more resistant than natural rubber to the swelling action of gasoline, kerosene and other harmful solvents.

Inventor Perfects Leg Shackle

NEWEST of the anti-crime weapons is a leg shackle invented by a Louisiana man.

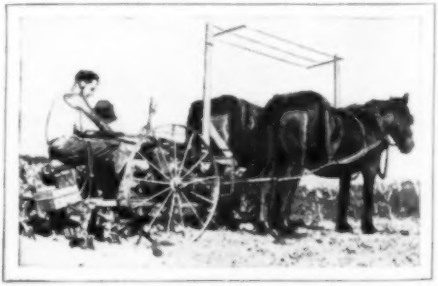
A prisoner wearing it may walk or sit down in comparative comfort; but the shackle is so constructed that it locks in a bent position if wearer tries to run.

New leg shackle locks in bent position when criminal runs.

Lad Tills Soil to Radio Music

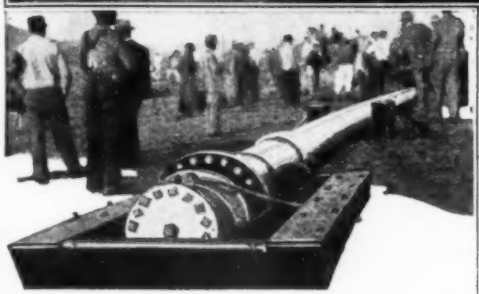
WHEN ploughing or cultivating began to interfere with listening in on his favorite radio programs, an Ohio farm lad conceived a novel radio hookup.

Two aerial masts are rigged on the tongue of the cultivator with an antenna stretched between them. Lead-in wires are run to the radio set placed in front of the seat.



Even the job of cultivating a dusty field has its moments for this Ohio lad who has rigged an aerial to his machine and hears his favorite programs through a set of earphones.

Undersea Pipe Line Loads Oil Tanker



The man at right (above) is using portable telephone on deck of tanker. He instructs shore loading station. Note pipeline across hills in background. At left is end of submarine pipe line before it was installed at bottom of bay. Below—the buoy, which marks submarine line, is being hoisted on deck. At end of its 50-ft. chain is pipeline which is connected to deck hose. Captain then phones shore tanker is ready for cargo.

LOADING of oil tankers by means of the submarine pipe line at Estero Bay, California, requires a method of communication between the crew of the oil tanker out in the bay and the control house on shore. The problem has been solved by means of a very novel telephone system.

Up on the hilltops at the oil loading point on Estero Bay are large storage tanks from which crude oil and gasoline are loaded into the tankers. A twenty-inch pipe line carries the oil from the oil storage tanks to the control house at the shore. Here the oil passes into a sixteen-inch welded-steel submarine line, 3,000 feet in length, extending down to the surf and into and along the bottom of the bay to the loading berth of the tankers. At the loading berth there are five drum-like white mooring buoys, each held in place by a 16,000-pound anchor on the floor of the bay, fifty feet below. Lines are extended from the tanker to each of these buoys, which hold the tanker in position in the bay.

Resting on the floor of the bay under a buoy, and attached to the sixteen-inch submarine line, are 175 feet of ten-inch hose.

A winch pulls this buoy out of the bay to the deck of the ship where the submarine line is attached to the deck hose. The tanker is then ready to take on its cargo of oil.

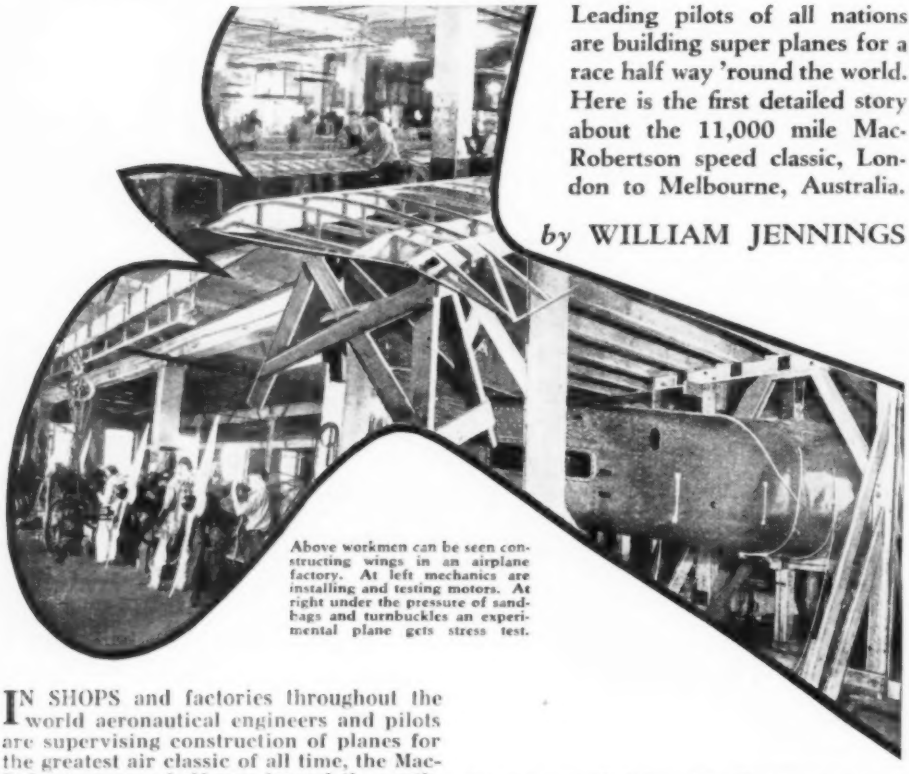
A smaller conical-topped buoy, encircled by a coil of insulated wire, is approached by a launch. The end of the coiled wire is passed up to the tanker's deck by the crew

(Continued on page 138)

Building SPEEDPLANES for

Leading pilots of all nations are building super planes for a race half way 'round the world. Here is the first detailed story about the 11,000 mile MacRobertson speed classic, London to Melbourne, Australia.

by WILLIAM JENNINGS



Above workmen can be seen constructing wings in an airplane factory. At left mechanics are installing and testing motors. At right under the pressure of sandbags and turnbuckles an experimental plane gets stress test.

IN SHOPS and factories throughout the world aeronautical engineers and pilots are supervising construction of planes for the greatest air classic of all time, the MacRobertson race half-way 'round the earth.

For the first time in the history of aviation famous pilots of leading nations will meet in a test of skill and endurance. For the first time also the many theories and developments of modern air travel must pass the rigors of 11,000 miles of gruelling competitive flight from London to Melbourne, Australia.

In this race against time the world's most noted ships and fliers will face not the mere hazards of a simple speed race, but all possible dangers encountered in flying. They will fly over land and water, over mountain and desert on long hops ranging from 750 to 1775 miles.

The pure and simple speed plane, the flying wings that have set records over closed courses, can not be used. They can not carry enough fuel for long hops. They do not have the slow landing speed required on the small, difficult fields that will be encountered.

As a result only stock commercial planes will be in the lineup at the take-off from London on October 20. Since announcement of the race last January, pilots and engineers have been studying and testing all possible means of improving the leading ships and engines of the world.

They have thoroughly investigated the advantages of the high wing versus the low wing monoplane and the biplane against single wing ships. Superchargers, variable pitch propellers, wing slots, streamlining and high altitude flying have all undergone the scrutiny of experts.

All the latest developments will be represented when the planes line up in London for history's greatest race that will mean $55,000 to the winner and thousands of dollars more from companies interested in the ships, motors, and fuel. With such a great sum at stake every flyer is bending every effort to build a plane that will combine speed and endurance for the first prize money and the $2,500 gold cup that goes with it.

With this fortune as their goal the world's

World's Greatest AIR RACE

leading pilots have been drawn like moths to a light to the MacRobertson International Air Race. They are interested only in winning as second place means only $7,500 and third place, $2,500.

Sir Charles Kingsford-Smith, the famous Australian pilot who flew over the Pacific from the United States to Australia, established the present record of 10½ days for the London-Melbourne flight in 1930. He

At right is Sir Charles Kingsford Smith, present holder of the record for the London-Melbourne flight, inspecting the new low-wing ship he will fly in the race. Below planes are shown lined up for the take-off in a cross country air race.

At left is Wiley Post, holder of the 'round the world record, standing beside the Winnie Mae. Above is the high altitude suit he will wear. A supercharger will supply it with oxygen.

Eight Laps Take Fliers Over Europe and Asia in 11,000 Mile Air Race

The 1500-mile first lap from London to Istanbul will test the long distance flying abilities of planes and pilots. Succeeding hops will present more hazardous conditions over desert and sea. Clyde Pangborn (shown above) is flying a Granville monoplane in the race. Walter T. Varney, head of Varney Speed Lines, of Los Angeles, will act as relief pilot and navigator for Franklin Rose shown supporting Miss Jane Wyatt during christening of plane. Sir Kingsford-Smith's plane has a 3500 m. cruising radius.

will seek to uphold his supremacy by taking part in the MacRobertson race.

He left the United States recently with a new low-wing Lockheed Altair. The American-built ship carries 500 gallons of gasoline and has a cruising radius of 3,500 miles. It is powered with a Pratt and Whitney engine, which is supercharged to supply 550 h.p. at 12,000 feet.

The United States has the largest number of entries in the race. Of the twenty-one American pilots entered, however, one of the greatest, Jimmy Wedell, has been removed by death, killed in a crash while instructing a student pilot. Another famous American pilot, Col. Roscoe Turner, was disqualified when his entry for a different type plane than the one originally entered arrived in London a few hours after the closing time.

Most outstanding of the American pilots is Wiley Post, who last year flew around the world in 7 days, 18 hours. Wiley Post plans to do some real altitude flying in the MacRobertson race. He has equipped himself with a specially constructed rubber suit for flying through the rare upper atmosphere. A special supercharger on his plane will force oxygen into the metal helmet of the suit.

He is also flying a Lockheed, the high-wing Vega, "Winnie Mae," which set the 'round-the-world record. He has built into his ship two superchargers to supply pressure for the motor and the suit.

Air is forced into the helmet of the suit and circulates out through the boots. The helmet is equipped with a connector block for leads from the radio to earphones inside the helmet. The superchargers increase pressure about three times at 30,000 feet. At that altitude, above ordinary storms that delay flying, Post hopes to increase the speed of the "Winnie Mae" to approximately 300 m.p.h. The variable pitch propeller will be adjusted to assure a better "bite" in the rarefied atmosphere.

The race will be run in eight laps and the winner will be decided on the shortest elapsed time. The first hop will be to Constantinople, a distance of 1,500 miles; then to Bagdad, 1,040 miles; Karachi, 1,545 miles; Calcutta, 1,370 miles. The next lap to Singapore is one that will test the judgment of the pilots as well as the qualities of their ships. They can go direct over water from Calcutta to Singapore 1,775 miles, or via Rangoon, the safer way for land planes, making hops of 635 and 1,184 miles for a total distance of 1,819.

Famous Women Fliers Will Compete Against Leading Pilots for Prizes

Some of the American entries are shown above. The map shows the choice of routes offered. Wiley Post's Winnie Mae will have two superchargers. Jack Wright's Monocoupe has been entirely rebuilt and faired out for tunnel type cowling. It has a 145 h.p. engine with top speed of 220 m.p.h.

The pilots have another choice of routes flying from Singapore to Darwin. It is 1725 miles direct. The more conservative fliers can fly to Batavia, 478 miles, and then to Darwin, Australia, 1,410 miles, a total of 1,888 miles.

The next hop is one of the most difficult of the land laps. It takes the fliers 1,260 miles across the wild bush land of Australia to Charleville. The final lap to Melbourne is a mere joy ride of 740 miles.

Trans-Atlantic flights are mere taxi jaunts compared to this stupendous undertaking. Only five of the cities will be control stops where officials will clock the times and check observance of rules. They are Bag-

(Continued on page 142)

Ladder With Adjustable Legs Solves Stairway Problem

Hard-to-get-at places are easily reached with the adjustable stepladder shown above. A set of double back legs may be shortened to compensate for any uneven surfaces.

ANY householder who has ever attempted to make emergency repairs in stairway wells or other hard-to-get-at places will welcome a new adjustable stepladder recently invented by P. S. Webster of Portland, Oregon.

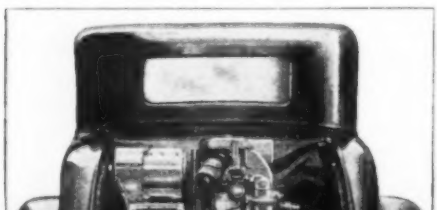
The Webster ladder stands firmly on conventional, level surfaces; but, in addition, it has an arrangement of double back legs which may be shortened to any length required by stairways or uneven ground.

An ingenious arrangement permits the legs to be locked rigidly in place at varying lengths. Although the construction is unusually sturdy, weight has been reduced to a minimum of only a pound and a quarter per foot. The ladder is available in various sizes.

Generator Parts Form Arc Welder

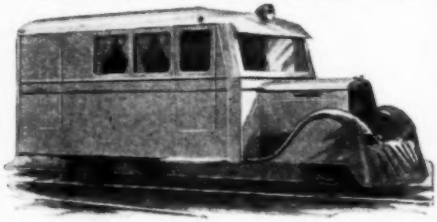
BUILT from auto generator parts, a new portable arc welder is driven by a single cylinder gas engine and develops a charge of 100 amperes.

The device runs about three hours on one gallon of fuel and easily handles such welding jobs as cylinder heads, blocks and auto frames. The machine is said to be ideal for the new process electric bronze brazing of fenders and auto bodies. Complete equipment, including engine, weighs about 260 pounds.



This portable arc welder made from generator parts, with its one cylinder engine, is easily stowed in back of car.

Gasoline Powers New Rail Car



The rail bus shown above runs on rubber tires, protected by metal safety cores which carry load if tire goes flat.

POWERED by gasoline, a new railroad vehicle known as a railcarbus is successfully competing with highway transportation, giving fast, clean service at low costs.

Rubber cushions between the rail and conventional flange insure quiet. Each tire has a safety core of metal which carries the load should the tire be punctured.

Tiny Screwdriver Fits in Pencil

A NEW pocket device combining a pencil and screwdriver is now available to mechanically minded men.

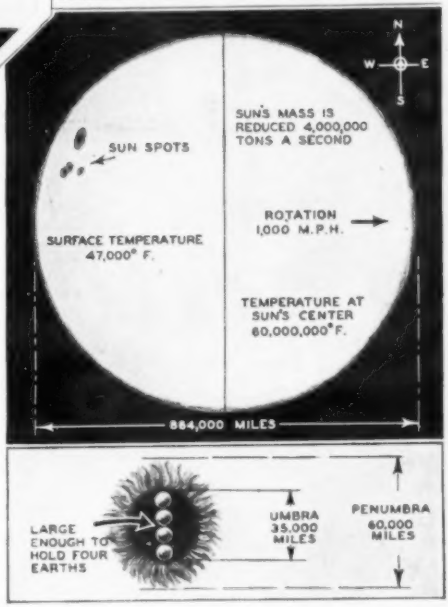
Made of molded bakelite, it has the appearance of a high grade automatic pencil. When the cap opposite the writing end is removed the screwdriver is ready for use.

Compactly built, the tool is exceptionally useful on small jobs.

The cap opposite writing end of this pencil unscrews to reveal handy pocket screwdriver.

Sun Spots Threaten World With Floods

Severe electrical storms, such as the one at left, are said to be caused by electrical particles shot from sun spots. Above is close-up of two sun spots.



Some interesting data on the sun and sun spots are shown in the drawings above. The inner dark spot is known as the umbra while the surrounding terrace of a sun spot is the penumbra. The spots are visible for about 25 days.

SUN spots, enormous storms on the surface of the sun, are on the increase. They herald a period of floods, great electrical storms, and disturbed radio and telegraph communication on the earth.

Astronomers have not agreed on the cause of sun spots, but they have found the sun's storms follow regular cycles lasting 11.1 years. A new sun spot cycle began this spring. More and more spots will appear on the sun until the cycle reaches its maximum in 1936 to 1938.

In those years floods will sweep the world, according to Captain Thomas J. J. See, noted astronomer and mathematician of the U. S. Navy and leading exponent of the sun spot theory.

"We are now entering a period of sun spot increase," he said. "This will bring with it ample rains and complete restoration of our water supplies.

"Since the decrease of sun spots began in 1928 very great droughts have been observed in nearly all countries of the globe. But now large sun spots have reappeared and will increase for the next four years, yielding vast floods from 1936 to 1938, and an increasing rainfall this year and next, after which the floods will become notable, as during the Mississippi floods of 1927. Measures should be taken to avoid damage from them.

"I have proved beyond any doubt that the 11.1 year sun spot period is reliable. From the year 328 B. C. up to 1927 there has never been a break in it."

Recent experiments of Dr. Ross Gunn, of the Naval Research Laboratory, show that the temperature on the outer surface of the sun amounts to 47,000 degrees Fahrenheit. It is estimated the temperature at the sun's core is 60,000,000 degrees.

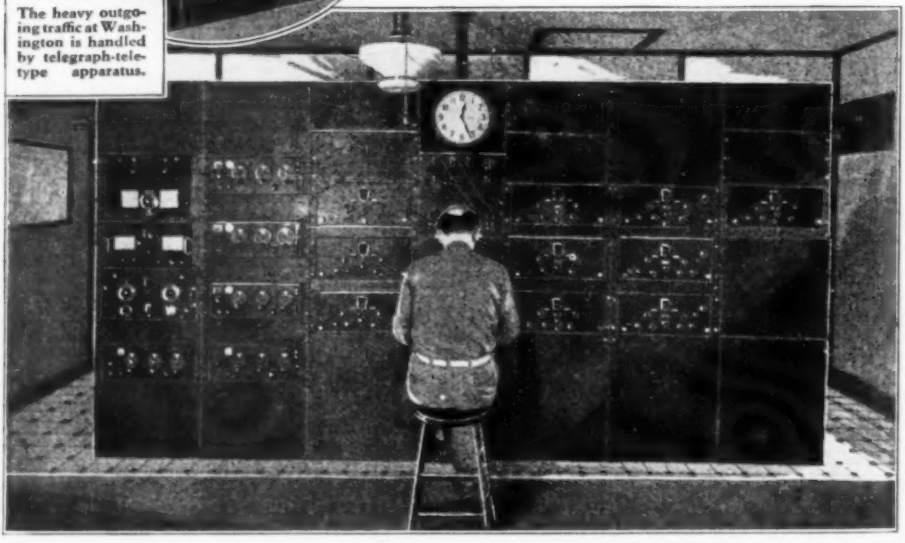
In this terrifically hot, molten mass the sun spots occur, evidently enormous disturbances on the sun's surface or in its atmosphere. The spots themselves sometimes are more than 100,000 miles in diameter.

Uncle Sam's W-A-R Rules

by **ROBERT W. GORDON**

Photo shows army operators receiving messages manually at Message Center.

The heavy outgoing traffic at Washington is handled by telegraph-teletype apparatus.



DOWN on the Potomac river, across from the nation's capital, stands a radio station with the most thrilling and significant call letters in the world—WAR, the call of the U. S. Army Signal Corps.

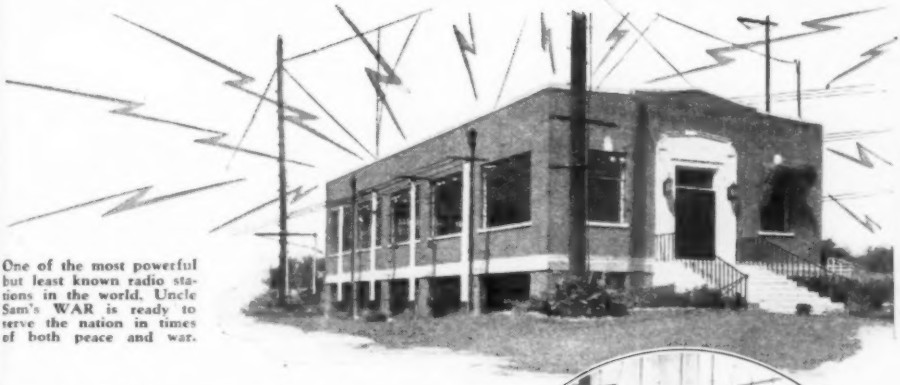
Guarding our interests in time of peace, yet ready, if need be, for defense in case of war, this station is the center of one of the most powerful but least known broadcasting systems in the country.

Quietly, but intensively, Uncle Sam has gone about the job of building a vast radio network which blankets the United States and stretches to the far corners of the globe. From the Canal Zone to the Philippines, from Hawaii to Alaska, 156 Signal Corps stations and more than 1200 members of the army radio amateur system snap to attention when WAR takes the air.

Should war be declared, the Army Chief of Staff in Washington could simultaneously be put in touch with every station on the great, invisible network. Corps commanders in the United States, commanding officers in far-flung army posts from Panama to China, army planes and transports in the Atlantic and Pacific Oceans could instantly be concentrated upon a common objective and welded into a powerful fighting unit by the staccato messages crackling

Photograph above shows the nerve center of the WAR network—the receiving panel at Battery Cove, Va., just south of Alexandria. Other stations of the chain are tuned in here; and, by means of a switchboard similar to those used by telephone operators, are plugged through to the operators at Message Center in the Munitions Building.

Nation's RADIO Network



One of the most powerful but least known radio stations in the world. Uncle Sam's WAR is ready to serve the nation in times of both peace and war.

through the ether from WAR's battery of short wave transmitters.

This system of 156 stations has its headquarters in Washington, yet so modest are its quarters that probably not more than a few hundred residents of the national capital know of its existence or could tell you of its location. The nerve center of the network is a single back room in the sprawling Munitions Building. A sign informs you that this is the Signal Corps Message Center.

At one side of the room sit fifteen men with headphones at their ears, nonchalantly tapping on noiseless typewriters. These are receiving oper-

(Continued on page 153)

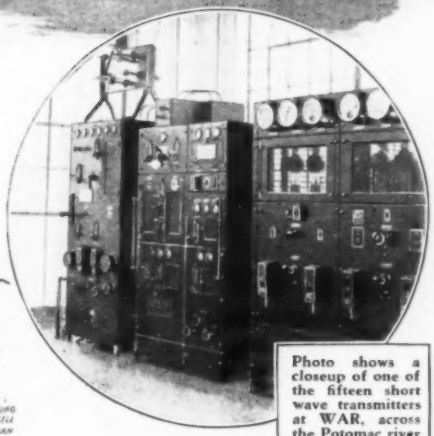
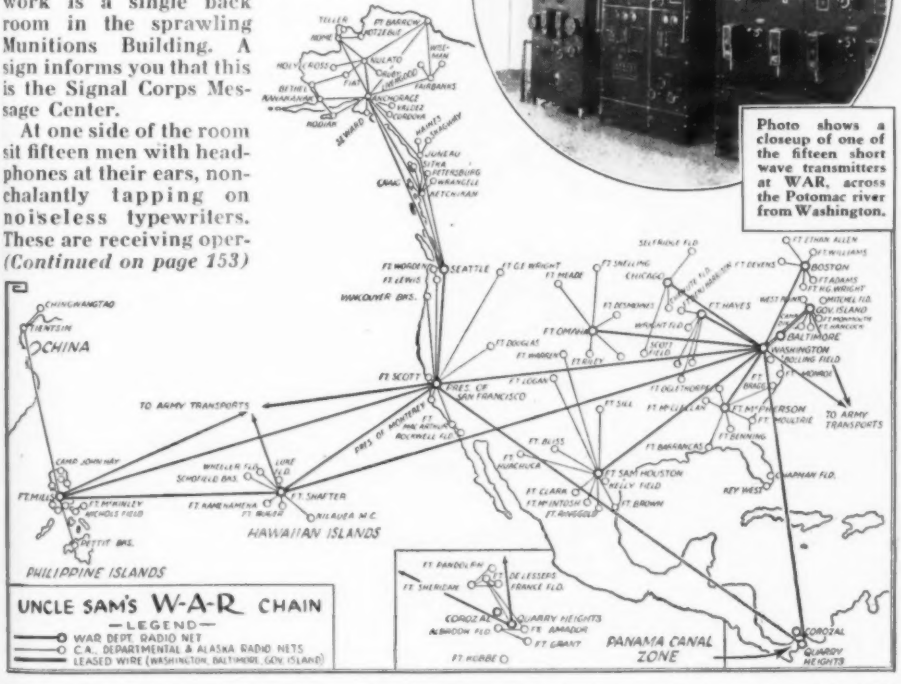
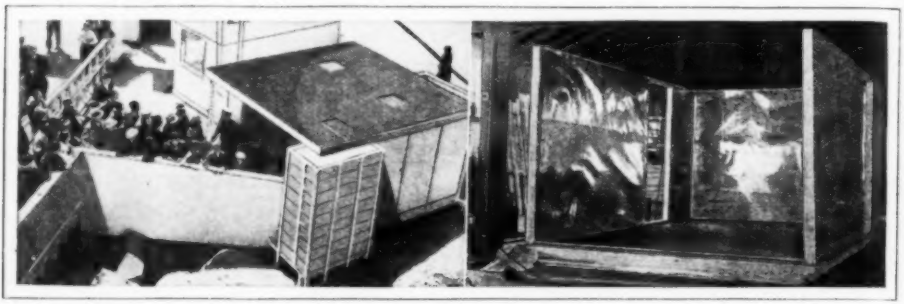


Photo shows a closeup of one of the fifteen short wave transmitters at WAR, across the Potomac river from Washington.



Here is a view of the strategic key stations on the WAR network. One hundred and fifty-six stations are included in this hookup, plus more than 1200 army amateur civilians. In an emergency, all stations could be tuned in instantly.

FOIL *Walls* INSULATE BYRD *Shack*



Left—Photo shows a crowd lined up at the Century of Progress to examine replica of the hut now occupied by Admiral Byrd in the Antarctic. Right—A construction photo showing how aluminum foil is built into the walls.

ISOLATED from his men in a tiny shack at Bolling Advance Weather Base, 125 miles south of Little America, Rear Admiral Richard E. Byrd is snug and warm despite the fact that only a four inch wall separates him from the Antarctic cold which occasionally reaches 100 degrees below zero.

Within the hut Byrd has a small oil-burning stove, heater and lighting apparatus; but the secret of the shack's resistance to cold lies in its construction. Embedded in the four inch wall are two paper-thin layers of aluminum foil, sometimes called metallation. The polished surfaces of this material are turned inward, thus reflecting the heat generated by lights, stove and heater back into the room. Laboratory tests have proved that only 5 per cent of the radiant heat escapes through the foil layers.

Made in Boston, the shack was built in panels and shipped, knocked down, to Little America.

Novel Tool Spreads Heavy Tires

THE task of spreading heavy tire casings for examination is simplified with a new portable tire spreader which has recently been placed on market.

Operating on compressed air, the spreader can be connected on any air line and works efficiently on any tire up to twelve inches.

Air-operated spreader holds tire secure until deflation cap is turned and pressure of the tire beads automatically closes it.

Folding Boat Is Carried by Hand

SPORTSMEN'S pleas for a light weight, collapsible boat have been answered by a new craft now on the market. Fitting snugly on the running board of an automobile, the boat is light enough to be carried under the arm when taken to the water.

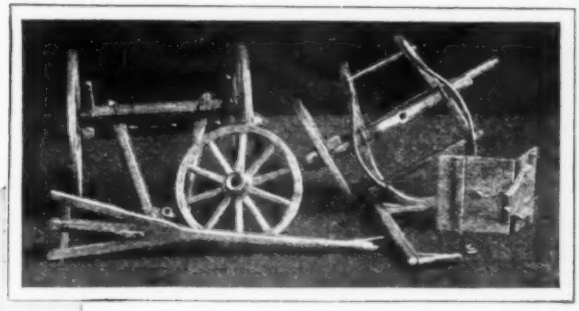
The craft is made of Douglas fir plywood and even the largest size folds into a compact bundle five by fifteen inches by ten feet.

The collapsible boats may be set up or knocked down in a minute. The sides unfold like the leaves of a book and the seats fit into slots and serve to hold the sides rigid. The boats draw little water and are easily propelled by oars or a small sideboard motor. The construction is unusually sturdy and the design is said to reduce dangers of capsizing to a minimum.

Easily seating two people, the boat is light enough to be carried by one person, as shown at right, above. The craft can be set up or knocked down in a minute and stowed on automobile running board.

Craftsman Builds Match Stick Novelties

Fred Spinden, of Abingdon, Illinois, shown above with a few of the kitchen utensils he has built up entirely from matches. After heads are cut off, matches are sanded, varnished, then shellacked, piece by piece, over a wood form to form desired curves. Below is teakettle made of 2,228 matches.



Tongue, pole cap, and all running gear of miniature farm wagon are made of matches, each wheel hub having 90 separate pieces. Ends of axle are threaded, as is inside of each hub.

This farm wagon constructed with 6,350 matches will haul 17 lbs. of ear corn. Even springs under front seat and end gate hinges are made of matches. Wagon weighs 1¼ lbs.

MAKING teakettles, skillets, model wagons, and scores of other articles by piecing together bit by bit thousands of matches is the unusual hobby of Fred Spinden, nimble-fingered craftsman of Abingdon, Illinois. Years ago he won a hobby contest with his match-constructed wagon model; since then he has been so successful with his novel model projects that he is planning to adopt his hobby as a business.

A full size teakettle was perhaps the most difficult of all of the match stick articles. Every match had to be soaked until pliable, and then bent to form the proper curves. Even the rivets used to fasten the ears for the handle are made of matches.

Novel indeed is the method used for making the spout. First carving it out of solid wood, Spinden then split it in half and built up the match structure over each half. When he glued the two halves together a perfectly formed spout was the result.

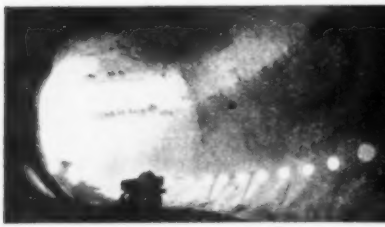
A full size match stick straw hat, size 7¾, has just been completed. When worn it can hardly be distinguished from the latest in straws. Even the bow is of matches, with the heads left on to add a dash of color.

Most of the curios have a single layer of matches carefully fitted together.

There being 42 matches to a box, Spinden keeps tab on them by counting the number of boxes needed for each article.

Before using the matches he clips the heads off with a razor blade, sandpapers each stick, and dips them in clear varnish to bring out the natural wood colors. Soldine shellac holds the matches together.

The AMAZING STORY



Faced with the task of harnessing the mighty Colorado, engineers have wrought miracles to triumph over nature. Here is the revealing story of their amazing feat—the building of the greatest dam project that the world has ever known.

RUNNING wild and free for countless centuries, carving a breath-taking gorge through massive cliffs of volcanic rock, the turbulent Colorado river is being tamed by men and machines in a gigantic battle which will end forever the recurrent droughts and floods which have devastated the Southwest.

The story of the Colorado's conquest is the most colorful epic in the history of civil engineering. Other giant dams have spanned mighty rivers but Boulder Dam dwarfs them all. Its height, 730 feet, is nearly twice that of any other dam. Its reservoir, 115 miles long, will form the largest artificial lake in the world. Its potential output of 1,800,000 horse power is more than twice that of Muscle Shoals and Niagara Falls. Everything about the dam is on a superlative scale—of a size and grandeur that is as unbelievable as it is amazing.

To begin with, engineers had to excavate four of the largest diversion tunnels the world has ever known, to shunt off the waters of the stream which have been known to develop a flow of nearly a quarter million cubic feet per second at flood time. These tunnels, which left the river bed dry for construction work, were 50 feet in diameter and 4000 feet long. Four hundred thousand cubic yards of gravel and broken rock were taken from the river's bed before the first concrete was poured in June, 1933. Yet today general construction work is fully a year ahead of schedule.

Concrete pouring goes on day and night in three eight-hour shifts. Giant carriers scream out over the canyon on steel cableways, swinging 20-ton buckets which pour out 8 cubic yards of concrete on each three-minute trip. In May, 1935, when the last bucketful is expected to be poured, 7,000,000 tons of concrete will have been used—enough to build a 16-foot highway from Seattle to Florida.

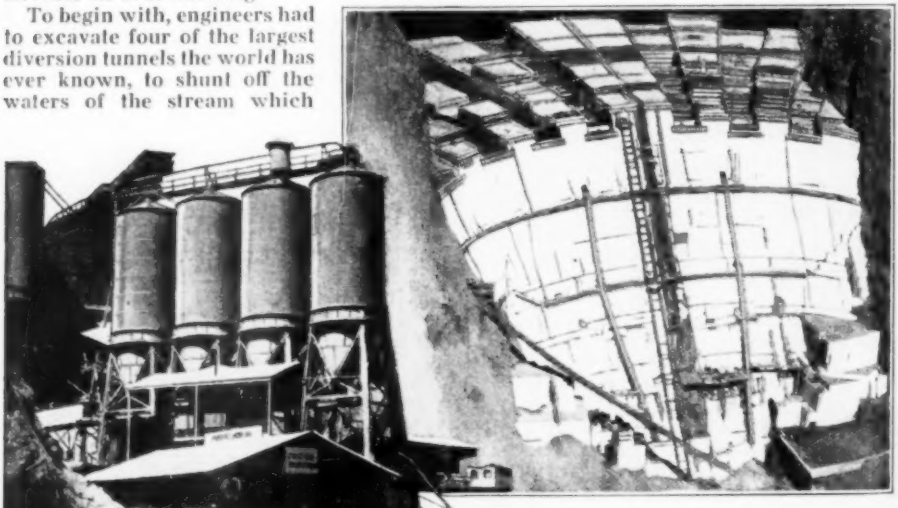
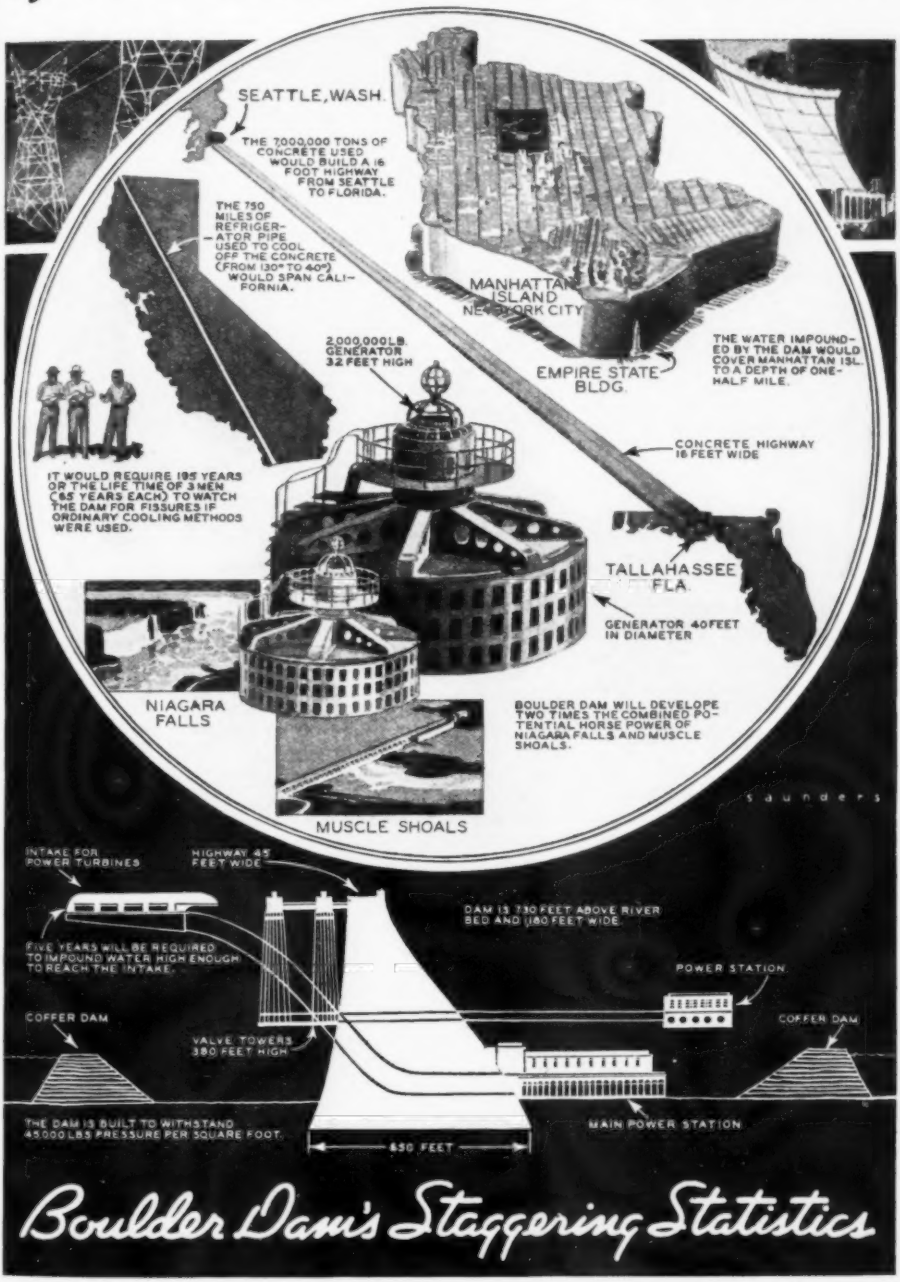


Photo at top of page shows a truck passing through one of the completed tunnels. Left, the largest concrete mixing plant in the world, on the edge of Black Canyon, on the Nevada side of the dam. Directly above is a picture of Boulder Dam today.

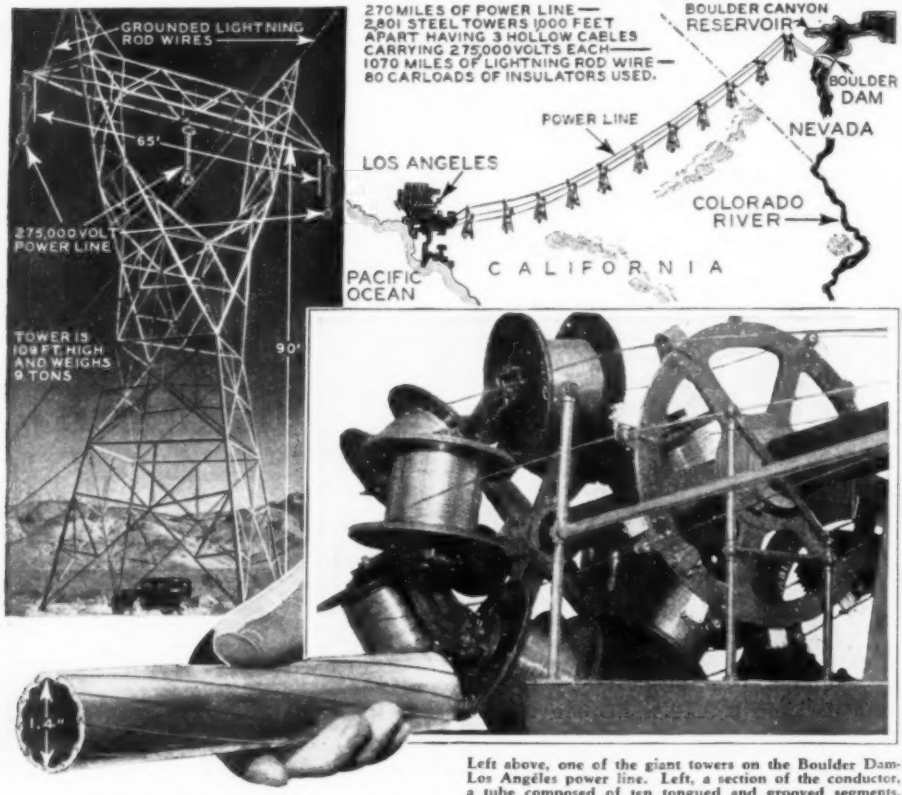
of BOULDER DAM

by MEL WHARTON


SEATTLE, WASH.
THE 7,000,000 TONS OF CONCRETE USED WOULD BUILD A 16 FOOT HIGHWAY FROM SEATTLE TO FLORIDA.
THE 750 MILES OF REFRIGERATOR PIPE USED TO COOL OFF THE CONCRETE (FROM 130° TO 40°) WOULD SPAN CALIFORNIA.
MANHATTAN ISLAND NEW YORK CITY
EMPIRE STATE BLDG.
THE WATER IMPOUNDED BY THE DAM WOULD COVER MANHATTAN ISL. TO A DEPTH OF ONE-HALF MILE.
2,000,000 LB. GENERATOR 32 FEET HIGH
CONCRETE HIGHWAY 16 FEET WIDE
IT WOULD REQUIRE 195 YEARS OR THE LIFE TIME OF 3 MEN (65 YEARS EACH) TO WATCH THE DAM FOR FISSURES IF ORDINARY COOLING METHODS WERE USED.
TALLAHASSEE FLA.
GENERATOR 40 FEET IN DIAMETER
NIAGARA FALLS
BOULDER DAM WILL DEVELOPE TWO TIMES THE COMBINED POTENTIAL HORSE POWER OF NIAGARA FALLS AND MUSCLE SHOALS.
MUSCLE SHOALS
saunders
INTAKE FOR POWER TURBINES
HIGHWAY 45 FEET WIDE
DAM IS 730 FEET ABOVE RIVER BED AND 1180 FEET WIDE.
FIVE YEARS WILL BE REQUIRED TO IMPOUND WATER HIGH ENOUGH TO REACH THE INTAKE.
POWER STATION
COFFER DAM
COFFER DAM
VALVE TOWERS 380 FEET HIGH
THE DAM IS BUILT TO WITHSTAND 45,000 LBS PRESSURE PER SQUARE FOOT.
MAIN POWER STATION
650 FEET
Boulder Dam's Staggering Statistics

The drawing above illustrates, in graphic fashion, the stupendous scale upon which Boulder Dam is built. The last concrete is expected to be poured in May, 1935, but the mammoth basin will require at least another five years to fill.

Mammoth Power Line Carries 275,000 Volts From Dam to Los Angeles


GROUNDED LIGHTNING ROD WIRES
65'
275,000 VOLT POWER LINE
TOWER IS 100 FT. HIGH AND WEIGHS 9 TONS
90'
1.4"
270 MILES OF POWER LINE— 2,801 STEEL TOWERS 1000 FEET APART HAVING 3 HOLLOW CABLES CARRYING 275,000 VOLTS EACH— 1070 MILES OF LIGHTNING ROD WIRE— 80 CARLOADS OF INSULATORS USED.
BOULDER CANYON RESERVOIR
BOULDER DAM
NEVADA
POWER LINE
LOS ANGELES
COLORADO RIVER
PACIFIC OCEAN
CALIFORNIA

Left above, one of the giant towers on the Boulder Dam-Los Angeles power line. Left, a section of the conductor, a tube composed of ten tongued and grooved segments, which is used to carry the 275,000-volt load. Above, the machine which manufactures the conductor tube. Segments on spools are woven together at rate of 30 feet per second.

The pouring of this enormous block of concrete involves grave technical problems. The chemical action of concrete mixtures produces temperatures up to 130 degrees. As the mass cools and begins to contract, cracks and fissures follow. To avoid this danger, refrigerating pipes are woven into every five feet of elevation. River water is first pumped through these pipes to bring the temperature down to about 80 degrees. Constant baths of refrigerated water bring the heat even lower—to about 40 degrees, several points lower than normal desert temperatures. When the cooling process is finished, the pipes will be filled with a cement mixture which will further serve to bind the giant columns in place.

Under ordinary methods, two centuries would be required to complete the cooling process. The lifetimes of three men, each living to age 65, would be spent in watching the structure for cracks and shrinkage; but this work is eliminated by the 750 miles of refrigerating pipe—sufficient to span California from north to south.

Rivaling the unbelievable wonders of the dam itself is the system of power conversion which will turn the rushing waters into a docile servant producing 1,800,000 horse power. Outlet and penstock pipes will range in size from 8½ to 30 feet in diameter. Individual sections of the 30-foot pipe will weigh 150 tons—so large that they cannot be shipped to the dam site but must be fabricated on the spot.

Generators 40 feet in diameter will produce the power which will be transmitted via high power lines to distant cities of Nevada, Arizona and California.

In the story of the building of these super power lines lies another gallant saga of man's triumph over nature.

Driving themselves ruthlessly under blazing desert suns which raise the temperature to 130 degrees Fahrenheit, an army of a thousand men is spinning a steel web across the torrid wastes, 270 miles to Los Angeles.

(Continued on page 138)

Scientist Invents Nickel-in-Slot Blood Pressure Machine

EVERYONE has put a nickel in the slot to make a telephone call, to buy candy, gum, horoscopes, and various gewgaws and "prize" packages; but soon, according to Dr. George A. Snyder of Hollywood, Calif., it will be possible to get a blood pressure reading for the same price.

Since the public became aware of the fact that excessive blood pressure accounts for twenty per cent of all deaths of persons past 50 years of age, Dr. Snyder has kept pace with this growing interest by inventing a machine which will make it possible for individuals to keep a check on this condition with a minimum of cost and inconvenience. Any adult can operate the device.

Photo shows Evalyn Knapp, film actress, demonstrating the nickel-in-the-slot blood pressure machine recently invented by Dr. George A. Snyder, of Hollywood, California.

New Ash Bin Keeps Cellar Clean

Pressure upon the foot pedal of this dustless ash container opens receptacle and leaves operator's hands free.

HOME owners who take pride in keeping their basements clean will welcome a new dustless ash container now on the market.

The device consists of a sheet metal cabinet in which the ashes are deposited by the operator through a receiving door opened and closed by a foot pedal, which leaves both hands free. The construction of the bin prevents dust from escaping and settling over the basement. A convenient sliding door in front panel of container provides an easy means of removing the ashes.

Gar Wood Builds Gunnery Target

GAR WOOD, marine speed king and builder of world champion speed boats, has turned his inventive genius to a new field and has developed a novel gunnery target. The craft is intended for long range practice of the United States Army coast defense gunners.

The ship is built along the general lines of a high speed power boat, with a specially rigged mast which flies a battle target.

Control of the craft is effected by the installation of a gyroscopic apparatus in the after cockpit. This device controls a system of air pressure power which holds the target-bearing speedster on a fixed course, regardless of counter action by winds or adverse seas. The ship is powered by a sturdy engine which maintained a speed of forty miles an hour in recent tests.

Invented by Gar Wood, famed speed boat pilot and boat builder, this pilotless craft will serve as a target for coast defense gunners. The craft is held on a fixed course by a gyroscope.

Steel Bridge 750 Feet Long Moved Bodily by Five Horses

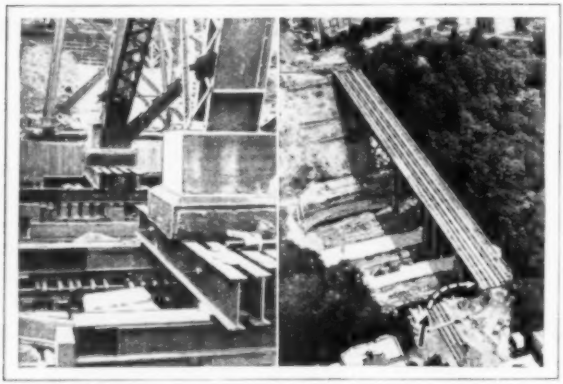


Photo at left, above, shows how massive bridge girders were placed on steel rollers. Right—Arrow shows how structure was shunted aside.

SETTLING gallantly into their collars, five stout horses recently contributed to an engineering miracle at Washington, D. C., when they moved a steel bridge weighing 1200 tons eighty feet in about eight hours.

Condemned by civic authorities, the bridge, which is 750 feet long and has towers more than 100 feet high, was shunted to one side to serve as a temporary detour while a new structure is being erected.

This unusual moving job was effected by first laying a series of heavy steel rails at the bottom of the valley, stretching from the old site of the bridge to its new one. The structure was then raised on huge jacks allowing the girders to rest on steel rollers.

Horses harnessed to sweep windlasses then supplied the power which inched the giant structure to its new position. The new bridge is expected to be finished in two years when the old one will be torn down.

Icebox-Stove Lightens Housework

DESIGNED to simplify the housewife's tasks, a new kitchen unit which combines an electric range and refrigerator was recently adopted by the National Home Economics Bureau as part of the Tennessee valley electrification program.

In appearance, the refrigerator-range resembles a big white box with rounded corners. The right half of the box contains the refrigerator which opens from the top to disclose two trays of ice cubes and four cubic feet of food storage space. The stove occupies the left half and contains three electric heat units on top and an oven below. Engineers estimate that the apparatus may be operated for about 25 cents a month.

Left to right—Mrs. Franklin D. Roosevelt, Nancy Cook, Dr. Louise Stanley, Economics Bureau chief and Col. Louis M. Howe inspect newly developed refrigerator-stove.

Sun's Rays Heat Russians' Water

Above—A Russian woman draws boiling water for her tea from the solar accumulator. Right — A closeup of the device which uses the sun's rays to heat water from 65° F. to boiling point. The apparatus will hold about sixty quarts of water.

A PRACTICAL means of utilizing the sun's energy has been devised by Soviet scientists who employ solar rays to heat water for the kitchen and bath of their observatory at Tashkent, Uzbekistan.

Using a glass-topped device resembling a gardener's hot-bed, they have succeeded in supplying themselves with all the hot water necessary for their needs. The device is about a yard square and holds 60 quarts of water. Experiments have proven that on a normal summer day the temperature of the water is raised from about 65 degrees Fahrenheit to boiling point. About 4000 gallons are heated yearly.

Light Rope Stops PLANE'S *Takeoff, says Nic Sprank in* ODDITIES *of* SCIENCE

Nic Sprank
AN ORDINARY CLOTHESLINE WILL HOLD BACK ANY AIRPLANE! EVEN A HUGE AIR LINER CANNOT GET AWAY IF TIED TO A POST WITH A SMALL ROPE.—THE POWER OF ANY PLANE DEPENDS UPON ITS AIR SPEED.
Harley W. Will, Swanton, Ohio.
THERE IS A NOWHERE! IT IS EXACTLY AT THE SPOT WHERE THE PRIME MERIDAN CROSSES THE EQUATOR AT LATITUDE 0°, LONGITUDE 0°.—
Ray Wroblenski, Nanticoke, Penna.
CONCRETE
WALK
MUSHROOMS ARE STRONGER THAN CONCRETE! WHEN GROWING UNDER A SIDEWALK THEY WILL FORCE THEIR WAY UP THROUGH THE PAVEMENT.—
John Burbank, Sea Cliff L.I.,N.Y.
NEWSPAPER PRESSES ARE FASTER THAN MACHINE GUNS! A BROWNING MACHINE GUN CAN FIRE 31,000 SHOTS AN HOUR, BUT 50,000 COPIES AN HOUR COME OUT OF A MODERN NEWSPAPER PRINTING PRESS.—Thomas Kent, Fort Benning, Ga.

Win $1! Send your Oddity of Science to Nic Sprank, Modern Mechanix and Inventions, 529 S. 7th St., Minneapolis.

Are You Driving Pleasure Car

by CARL D. WEBB

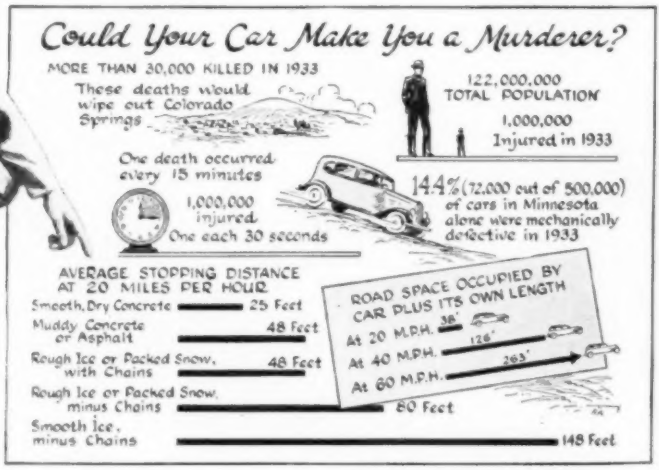
One in every three U. S. cars needs brake adjustments. One in every nine is a potential killer. This story gives the lowdown on the menace of bad brakes and tells you how to avert accidents.

TWO men in a heavy touring car were roaring down the Jack Rabbit trail in California. Faster and faster they sped as the dark night and the deserted road lulled the driver into a false sense of security. Suddenly, as he rounded a curve, he saw a dark shape ahead. Frantically he jammed on his brakes and jerked the steering wheel. A wailing scream from the tearing tires—then a terrific crash as the skidding car smashed broadside into the obstruction. The two men in the touring car probably did not live long enough to feel the searing heat of the flames which enveloped their car and the gasoline truck which they had hit.

These two men, one an innocent passenger in the death car, were killed by bad brakes. The unprotected driver of the truck was badly burned. The trucking company lost the truck as well as the load of gasoline. But this is only one of the many accidents in which thousands of innocent people are killed every year through defective brakes.

Despite the fact that inventors and designers are working night and day in developing electric, hydraulic, vacuum and air brakes, and that police departments, traffic officers, and safety agencies of all kinds are continuously testing and adjusting brakes, *automobile accidents kill nearly ten times as many people annually as do fire-arm accidents.*

A California traffic patrolman points out the amazing statistics derived from a study of traffic accidents in 1933. Note that one person was killed every fifteen minutes and one injured each thirty seconds of the year.


Could Your Car Make You a Murderer?
MORE THAN 30,000 KILLED IN 1933
These deaths would wipe out Colorado Springs
122,000,000 TOTAL POPULATION
1,000,000 Injured in 1933
One death occurred every 15 minutes
1,000,000 injured One each 30 seconds
14.4% (72,000 out of 500,000) of cars in Minnesota alone were mechanically defective in 1933
AVERAGE STOPPING DISTANCE AT 20 MILES PER HOUR
Smooth, Dry Concrete 25 Feet
Muddy Concrete or Asphalt 48 Feet
Rough Ice or Packed Snow, with Chains 48 Feet
Rough Ice or Packed Snow, minus Chains 80 Feet
Smooth Ice, minus Chains 148 Feet
ROAD SPACE OCCUPIED BY CAR PLUS ITS OWN LENGTH
At 20 M.P.H. 38'
At 40 M.P.H. 126'
At 60 M.P.H. 283'

What would you think if you read in your morning paper that a band of murderers had killed every man, woman, and child in Colorado Springs, Colorado? Doubtless you would be horrified; yet last year automobile accidents in the United States killed more than 30,000 persons.

You can avoid becoming a member of this band of murderers by careful, intelligent use and proper upkeep and adjustment of the efficient brakes on your car.

Science Develops New Equipment

Power brakes, new types of brakes which exert far more pressure than the human foot, are stopping the newest motor cars. Hydraulics, dynamics, air pressure, vacuum, and even electricity and magnetism furnish the power for operating the new and larger brakes which stop today's high speed, super-power automobiles.

The sign, "Air brakes, keep distance," appears frequently nowadays on the rear of trucks and busses. A touch makes these brakes absorb hundreds of horse power to stop the heavy vehicles. Many of the heavier pleasure cars also have this type of brake—the same as are used on railway trains.

Brakes which are set up by a small elec-

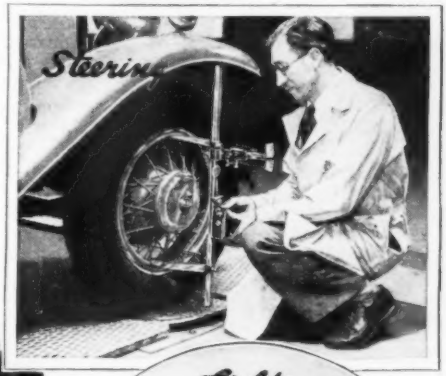
or DEATH TRAP?

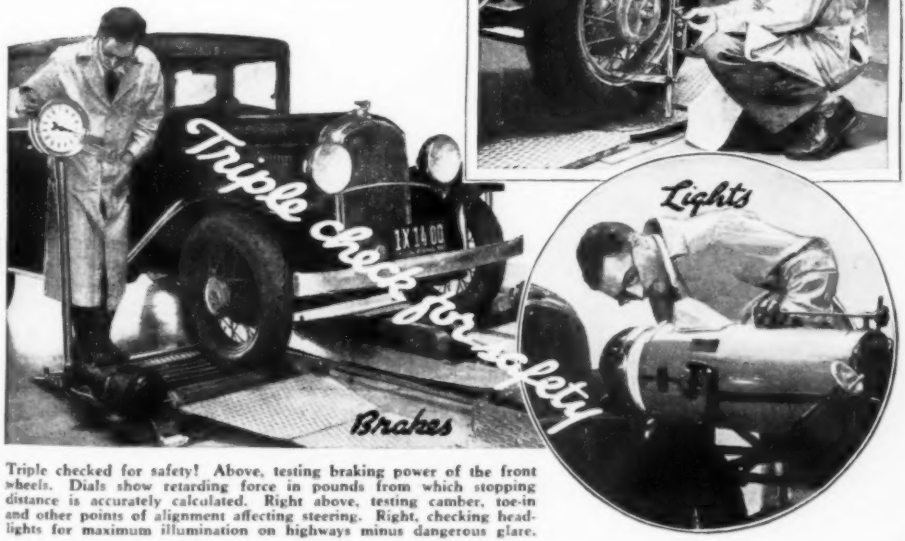
tric motor on each wheel are being tested; but the newest power brake is one involving magnetic principles. A ring-shaped electromagnet is attached to the ends of the brake band and a soft iron armature is attached to the brake drum. When a small amount of electricity from the car's storage battery energizes the electro-magnet, it grips the armature which is forced to revolve a fraction of a revolution. This sets up the brake band on the drum and quickly stops the vehicle.

This brake is especially useful on truck and trailer trains. Because electricity actuates the brake system, there is no time lag between the setting up of the truck brakes and the trailer brakes, thus preventing the trailer from over-riding the truck. The controller of this brake merely determines the amount of current sent to the magnets. For this reason it may be operated by a little lever near the steering wheel. A touch of the finger on this lever will stop almost instantly the heaviest truck and trailer train. Like most of the power brakes, although the electric brake was originally designed for truck use, its ease of operation, simplicity of construction, and its quick, powerful stopping action is rapidly bringing it into favor for pleasure cars.

(Continued on page 134)

Photo shows officer testing brakes on highway in safety drive. A machine on the running board records the distance the car travels before it is brought to complete stop.





Triple checked for safety! Above, testing braking power of the front wheels. Dials show retarding force in pounds from which stopping distance is accurately calculated. Right above, testing camber, toe-in and other points of alignment affecting steering. Right, checking headlights for maximum illumination on highways minus dangerous glare.

World's Smallest Airplane Motor Lifts Model to 8000 Feet

Walter Hurleman, Philadelphia inventor, displays the midget plane motor which has flown a model with a six-foot wing fifty miles.

A NEW performance record for midget airplane motors was recently hung up by Walter Hurleman, Philadelphia inventor, when his tiny power plant lifted a model craft more than a mile and a half above the earth.

The Hurleman motor develops eight-tenths horsepower and has demonstrated, in tests, its ability to fly a plane with a six-foot wing spread over fifty miles at heights reaching 8000 feet. The actual motor alone weighs only 6½ ounces; complete with propeller and tank full of fuel, 19¾ ounces.

Chinese Perfect Floating Hangar

UNIQUE amongst aviation developments is a floating steel hangar housing a seaplane in the Yangtsze river.

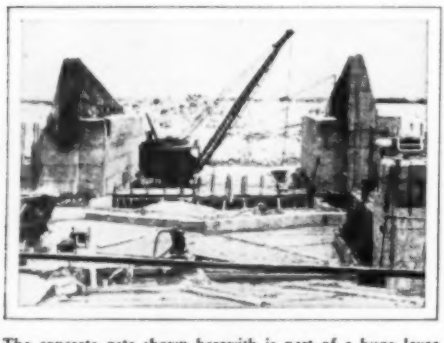
To operate the plane, water is pumped into the flooding compartment until the machine is water borne and can be taxied out. Sinking or floating the hangar is accomplished by means of a centrifugal pump.

Concrete Gates Check Hurricanes

MILLIONS of dollars are being spent in Florida for the erection of concrete hurricane gates which are expected to avert future storm damage to life and property.

Previous hurricanes have wrought tremendous havoc around Lake Okeechobee, the wind literally blowing the water out of the lake. To prevent a repetition of these disasters, protective levees are being thrown up around the south shore of the lake. Hurricane gates are to be built at exit points to provide for navigation.

Under the new program, when high winds begin to blow, the gates will be closed, completing a protective wall around the territory.



The concrete gate shown herewith is part of a huge levee now being built around Lake Okeechobee, Florida. Gates are closed during high winds to avert hurricane damage.

Balloon Float Prevents Drowning

BATHING fatalities are expected to be reduced to a minimum with the appearance of an anti-drowning device pronounced perfect by lifeguards.

A deflated balloon containing a gas cartridge is attached to the bathing suit. Pressure breaks the cartridge, releasing gas which inflates balloon.

Photo shows new anti-drowning device approved by life guards. Balloon indicated by arrow holds gas cartridge which may be broken to release gas inflating balloon, floating the stricken swimmer for hours.

Device Destroys Telephone Germs

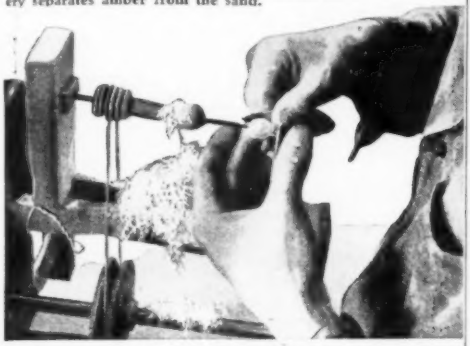
GERMS and offensive odors which cling to telephone mouthpieces are speedily eliminated with a new, cylindrical sanitator.

The device consists of a small fluid container with a self-sterilizing wick. This wick is applied to the surface of the mouthpiece and destroys scents and germs instantly. Enough of the fluid, harmless to humans, is contained in the cylinder to last a year. The device is made in two sizes, for both home and office use. The smaller size can easily be carried in the purse or pocket, making it readily available for those who must use public telephones frequently.

By applying wick of chemically filled container to phone mouthpiece as shown, germs and offensive odors are destroyed.

Giant Dredges Scoop AMBER *From Pits*

In greatest amber-producing region of world, Samland, in East Prussia, giant dredges such as that above scoop up precious "blue dirt" in which amber nuggets are found by thousands. With uncanny precision special machinery separates amber from the sand.



Shaping amber bead at grinding machine. Shavings of amber, scattered about work table, are carefully saved and later used to make amber varnish and molded amber products.

Faulty outside layers are removed from precious amber nuggets in an amber workshop with broad chisels. Amber is then cut to shape and finished into jewelry by machine.

IN a series of open pits near the Baltic Sea, men are engaged in one of the strangest mining projects in the world.

Equipped with machines resembling giant ditch diggers, they are literally mining jewelry from fir trees.

These fir trees are no longer in existence. They flourished thousands of years ago, in what geologists know as the Tertiary period. In the years of geologic change that followed, the trees perished; but while they lived, resin dripped from their trunks, fell to earth, became fossilized and was transformed into the precious substance that we call amber.

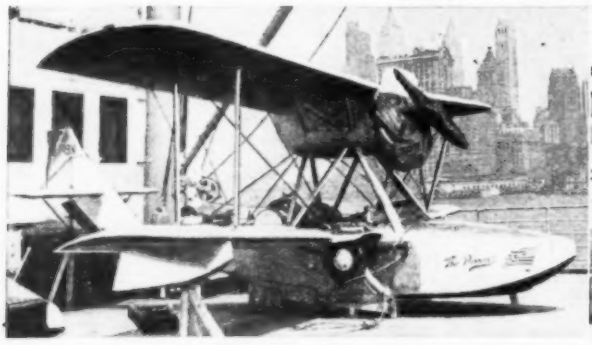
Today, in the blue sands of Samland, in East Prussia, the greatest amber-producing region in the world, huge dredges are working ceaselessly, scooping vast pits out of the ground and handling thousands of tons of mineral sands daily in a quest for the rare and beautiful fossil resin.

This resin is subjected to a series of mechanical processes which turn it into necklaces, earrings, brooches and other ornamental jewelry, not to mention cigaret holders and pipe stems. Amber is only a trifle harder than the human fingernail and hence can be carved, bored or turned on a lathe with ease.

The first step in the making of a necklace, for instance, is the removal of the rough outer layer from the crude amber with a broad chisel. The material is next cut into rough cubes of workable size. Tiny lathes then turn out the beads; tiny drill presses pierce the holes for threading; and skilled fingers sort and string the finished product.

In addition to its ornamental uses, amber is also an excellent insulator of electricity.

First All-Steel Flying Boat Returns From European Trip



Shown above is "The Pioneer," the first all-steel flying boat ever built, on its return from Europe aboard the S. S. Roma. Right—Photo of Pilot Henry Ramsdell, who flew the ship from New York to Long Island.

MARKING a new step in the advancement of American aviation, the first all-steel airplane ever built recently returned to New York City after a series of demonstration flights in Europe which won high praise from foreign aeronautical authorities.

The ship, named "The Pioneer," is a four place amphibian and is powered by a single motor slung just below the top wing.

New Phone Dials Own Numbers

ENGLISH automatic telephones are now being equipped with autodial devices. One has but to turn a pointer to any one of 50 numbers listed on the wheel and press a lever—the robot gadget does all the dialing.

Midget Level Clings to Line

THOUGH only three inches long and hardly larger than a lead pencil, a midget octagon-shaped level has more uses than the conventional large instrument.

Used on a line for laying out foundations and grading roads, twin hooks prevent it from falling off. Clipped to the edge of a steel square, it can be used for either horizontal or vertical work.

Tiny level has metal clips which slip over chalk line. Metal carrier enables it to be fitted to edge of try-square or straight-edge.

Sliding Doors Make Comfortable Compartments of New Pullman Berths

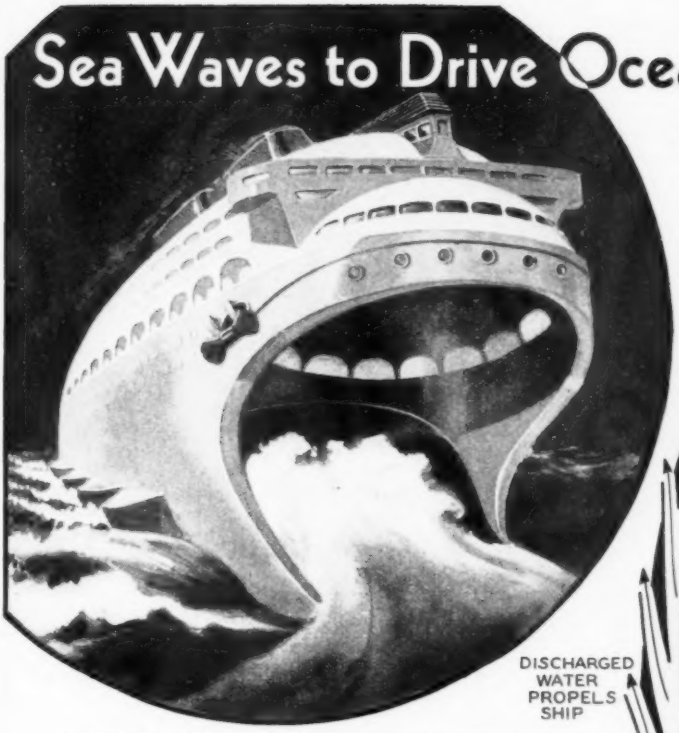
NEW comforts are assured Pullman travelers by an ingenious arrangement of sliding aluminum panels which transform each berth in the ordinary section into a small, private compartment. The panels are automatic in operation and completely enclose each berth. In addition to furnishing the utmost in privacy, the new berths have also solved another troublesome problem—the job of disrobing in an upper berth. A small folding stairway leads to each upper and is completely enclosed by what resembles a shower-bath curtain. Thus the occupant of the upper may stand while dressing or undressing.

Above—Closeup of individual washstands. Right—Stairway leading to upper berth, with the sliding panels shown partly closed.

The daily parade to the wash room at the end of the car has also been eliminated with the inclusion of individual washstands in each berth. The new Pullmans are to be attached to the Union Pacific streamlined train.

Sea Waves to Drive Ocean Liner

German engineer plans to build novel "whale mouth" ship using water as propelling medium.



R. J. May's "whale mouth" ship will present this unusual view from the forward end. Within the mouth can be seen the observation windows. Along the sides are the water spouts.

RESEMBLING a ferocious monster of the deep, an ocean liner is being designed in Germany to make use of the sea's unlimited energy as a propelling medium.

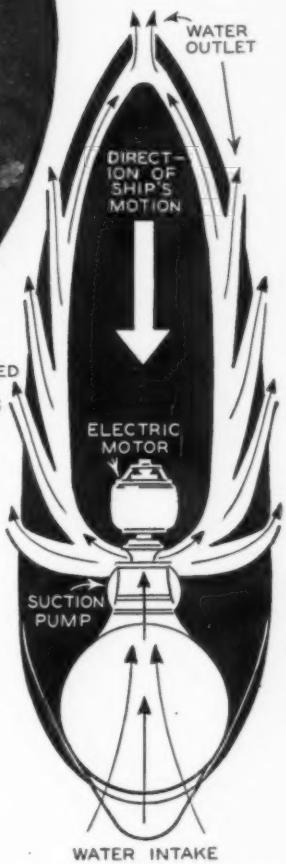
The ship will have an opening in its bow that will give it the appearance of a giant whale swimming over the water with its jaws ready to devour anything in its path. This opening will gather up the ocean waves and pass them through the ship. The water will be ejected by means of spouts along the sides of the liner. The water, forced out under pressure, is expected to drive the ship forward at great speed. As a result the expense of operating a liner is expected to be reduced.

Within the mouth of the ship will be an observation platform and a row of windows, through which passengers may watch the waves surging into the hold. The unusual liner will be thoroughly streamlined to increase its speed.

R. J. May, an engineer of Pirna, Elbe, Germany, conceived the idea for the novel ship. He plans to install a large suction pump at the rear of the liner's mouth. This will draw up the water and force it under great pressure through pipes to the spouts along the sides. The electric motor driving the fan will be powered by a Diesel engine.

May plans to build a model this fall. It will be tested on the Elbe river near Dresden, capital of Saxony. If tests prove successful, the engineer will seek to interest steamship companies in his project.

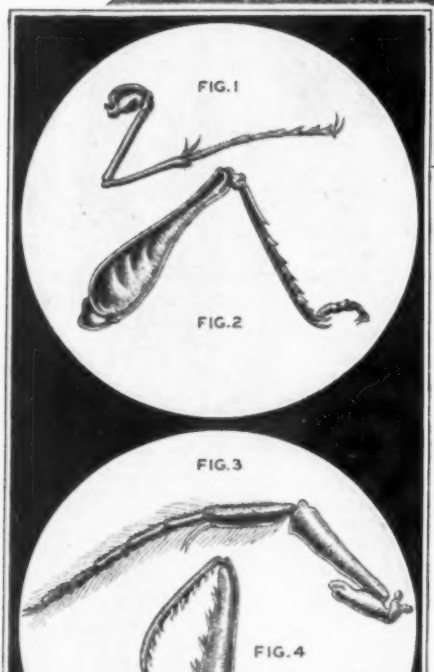
Unlike the ordinary liner which has propellers at the stern only, May's ship will have nine points of propulsion. These are the nine spouts located at the sides and stern.



Ocean waves will be drawn up into water intake as shown in the above plan drawing. An electric-Diesel drive will propel the suction pump. This pump will force the water into pipes which lead to the nine spouts at the sides and stern of the ship. The pressure of the water leaving the spouts will drive the liner forward in the direction shown by the arrow. The ship's unusual motive power and its streamline construction is expected to reduce operating costs and result in greater speed than is possible with present liner. The designer plans to test a model this fall.

INTERVIEWING INSECTS

This fuzzy, terrifying creature is not a prehistoric monster roaming some dead planet, but only a member of the bee family seen through a microscope exploring an orange.



Under the magic eye of the microscope, nature's secrets are mysteries no longer. Above is a representative grouping of insect legs, showing various pecularities which are the product of the insect's environment. Figure 1 is the delicately jointed walking leg of the wasp; Figure 2, the jumping leg of a grasshopper; Figure 3, swimming leg of diving beetle; Figure 4, grasping leg of the mantis. Note particularly the feathered edges of beetle leg which aid in swimming, and pincer-like detail of mantis foreleg.

CONSTANTLY under foot and all about us is a world of living things so small as to be almost invisible; yet the magic power of the microscope makes giants of these tiny creatures, forces them to talk, to expose their secrets and to reveal the marvels of an existence as complex as our own.

The inhabitants of this curious world are the insects, nature's most elaborate experiment in animal construction. Swarming up a grass blade, as large to him as an oak tree is to a man, goes a bug so small that the human eye can scarcely see him. Yet the microscope reveals that this tiny creature has intricately constructed, compound eyes, delicate sense organs on antennae and feelers and a digestive system as efficient as that of a human being.

Nature's Law of Life

Down into the cool depths of a shaded pool a diving beetle swiftly rows himself, with oar-like legs, into the safe cover of a mass of algae. There he seizes still smaller creatures as his prey by means of mouth parts more numerous and more perfectly adapted than our own. And to assure a crop of diving beetles for posterity, nature has equipped him with a means of reproducing his kind with organs and processes common to all higher animals.

Study of this fascinating insect world opens up a new field to hobbyists. A wealth of information is to be had by observing the tiny creatures afield, by making a

WITH A MICROSCOPE

by

JULIAN D. CORRINGTON, Ph.D.

Tiny insects, almost invisible to the naked human eye, are magnified to giant proportions and made to tell their secrets to the scientific reporter armed with a microscope. In this fascinating article an authority tells how to probe the mysteries of the insect world.

pinned collection of specimens and by preparing microscope whole mounts of small subjects or parts of the larger ones.

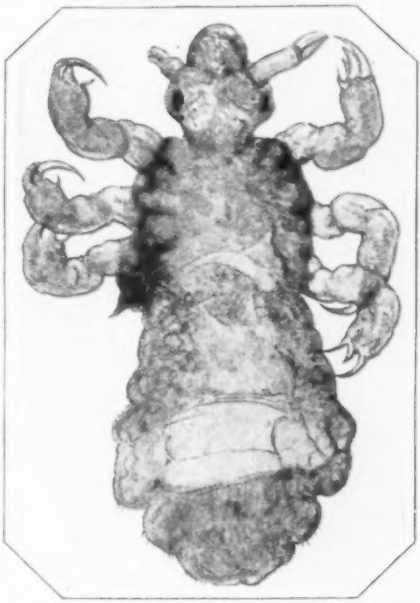
Microscopes are within the reach of practically everyone today, but as in buying any other standard commodity, you will get what you pay for. Do not expect to secure a research instrument for five dollars, although instruments ranging in price from five to eighteen dollars can be used with good results in this series of experiments. These are good microscopes, not toys. Nothing under five dollars is worthy of consideration.

Selecting a Microscope

Buy the best microscope you can afford and regard it as a lifetime investment, as you would an expensive radio or a house. There is nothing about a microscope to deteriorate, given reasonable care to avoid scratching lenses, and an occasional cleaning with a soft cloth. Do not buy on a basis of power (magnification); it is a mistake to assume that you will want the highest powers. Nine-tenths of your work will be done between the ranges of 50X and 500X. A standard-sized school biological microscope is the best all-around machine for the adult hobbyist.

Buy only an instrument made by a responsible and reputable manufacturer. Domestic makes are recommended since adjustments or repairs are more available.

Having secured your microscope, you are ready for actual work. Go afield with an insect net and one or more small bottles containing 70% alcohol for killing and preserving your specimens. Pure alcohol may be diluted with tap water to approximately 70% strength for this purpose.

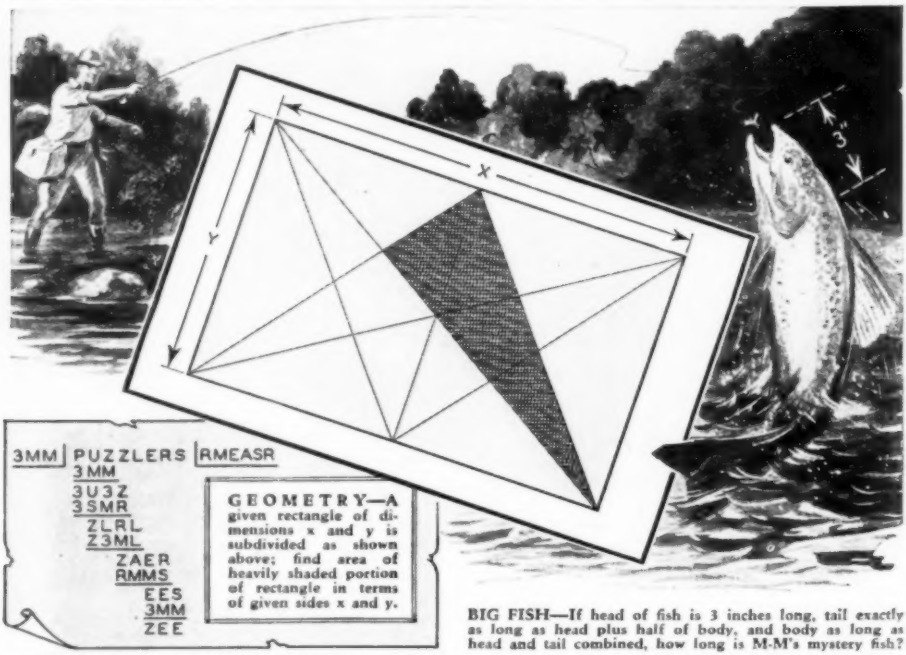


Upper photo shows the preparation of slide mounts, a process described in this article. Lower photo—The fearsome object is the common "cootie" of war fame.

Collect a small grasshopper (meadow), a cockroach (beneath logs in woods), several different bugs (garden), several butterflies

(Continued on page 140)

$25 PRIZES *for* 3 M-M PUZZLERS



A DIVISION PROBLEM—Each letter in above cryptic division corresponds to certain numeral. When correct substitutions are made, what is quotient and remainder?

BIG FISH—If head of fish is 3 inches long, tail exactly as long as head plus half of body, and body as long as head and tail combined, how long is M-M's mystery fish?

FOLLOWERS of Izaak Walton should have little trouble in finding the size of M-M's fish—a little algebra will tell the tale. And here's another geometry problem that may or may not be as easy as it looks. Locate the letters representing 0 and 1 in the coded division, and the rest will be easy.

For the neatest and most accurate solutions for all three puzzlers, accompanied by explanations of 100 words or less telling just how each problem was worked, MODERN MECHANIX AND INVENTIONS offers $25 in prizes, as follows: First prize $10; second $5; and four third prizes of $2.50 each.

Contestants must give age, occupation, and education, though this information will not be considered in awarding prizes.

Your entry should be postmarked before August 25, 1934. Decisions of the judges will be final, and no entries will be returned. In case of ties, duplicate prizes will be awarded. Answers and names of winners will be in the November issue.

Employees of this magazine or their relatives are not eligible to compete. You don't have to buy a copy or be a subscriber to enter. Address 3 M-M Puzzler Contest, 529 So. 7th St., Minneapolis, Minnesota.

July Math Contest Winners

THE many ingenious methods used by readers in working out the three problems of the July contest made judging of this contest rather interesting.

In Problem No. 1 each side of the square field turned out to be exactly 12 miles long, giving 92,160 acres as the area of the tract.

The sparrow in Problem No. 2 flies 5000 feet to get the grasshopper and 1000 feet back to the observation platform, making a total of 6000 feet of flying in relation to the ground.

No exact answer was possible for Problem No. 3. The distance between the fence and the power line pole was computed by the winning entrant to be 26.03287754+ feet.

Harry Frye of Tullahoma, Tennessee, was awarded first prize of $10 for his concise and accurate solutions to each of the three problems.

Earl Hope, Vancouver, British Columbia, gets second prize of $5. J. C. Sanderson, Minneapolis, Minnesota, Roy Hinshaw, Kannapolis, North Carolina, George W. Ward, Mobile, Alabama, and L. H. Willmer, Versailles, Missouri, each receive awards of $2.50.

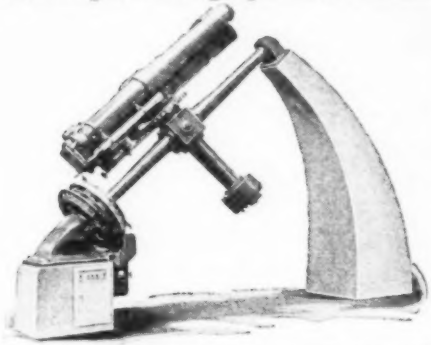
Photo-Electric Curtain Protects Jewels From Thieves

ALARMED by the increasing number of raids by "smash and grab" bandits, London jewelers are safeguarding their window displays with a photo-electric device which successfully balks the most cunning crook.

When the thief smashes the window he also breaks through an invisible curtain of photo-electric light thrown across the space. Simultaneously with the tinkle of falling glass, the protective mechanism goes into operation. As the electric field which forms the protective curtain is disturbed, a steel shutter, operated by an electric relay, slides forward and completely covers the jewelry.

Photo shows how steel shutter covers jewel trays when window is smashed and photo-electric curtain is broken.

Telescope Photographs New Stars



This new Naval Observatory telescope will photograph movements of stars and planets as an aid to navigation.

A 15-INCH telescope through which men never look will be used by the U. S. Naval Observatory to photograph heavenly bodies never seen. The new instrument is of the refractor type. Three lenses, accurately curved to a millionth of an inch, are arranged at the upper end, with photographic plates inserted at the bottom.

Screen Prevents Radiator Rust

Photo shows rust screen being removed from hose for cleaning.

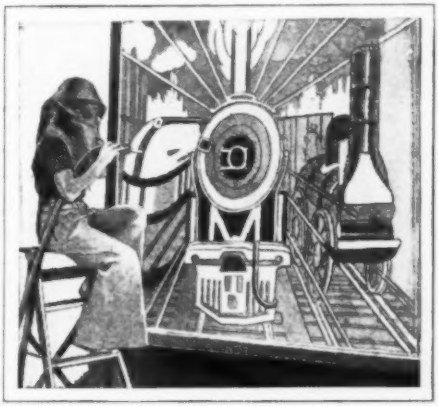
RADIATOR rust, the bane of motorists, may now be prevented by insertion of a copper screen in the upper part of the hose connecting radiator and engine.

Rust particles are intercepted and drop to bottom of screen, easily removed for cleaning.

Glass Mural Is Etched With Sand

ART and machinery recently joined forces to produce a remarkable mural which was etched, carved and sandblasted in glass.

More than two tons of inch-thick glass were used to make the twenty-seven panels of the mural which will hang in a New York hotel. Developed under a secret process, the completed project depicts a complete history of transportation and power.



A sandblaster is shown putting the finishing touches on one of the 27 panels which were etched and carved in glass.

Death Ray Machine Is Invented by Cleveland Scientist

Photo shows Cleveland inventor in his laboratory with death ray machine in early stages of development. This machine is said to have proven successful in practice.

REPORTED to have tremendous military possibilities, a successful death ray machine is said to have been invented, after lengthy experiments, by a Cleveland scientist.

A partial description of the machine's construction and operating principles was recently offered at a session of the National Inventors' Congress at Omaha, Nebraska.

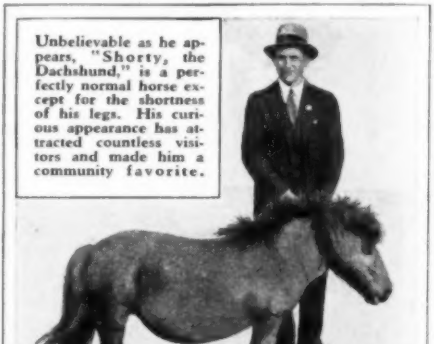
Privileged witnesses to demonstrations of the machine declared that experiments were successful to a startling degree. Dogs, cats and rabbits were killed instantly, their blood turning to water as the ray was turned upon them. It is reported that the machine has been suppressed by the government until such time as it may be needed as a defensive weapon.

Portable Lights Aid Fire Squad

GERMAN inventors have solved the problem of firefighting visibility with the perfection of a powerful portable searchlight which will cut through virtually any wall of smoke. Members of the Berlin fire department equipped with the new light are enthusiastic over its performance. The light and batteries are carried on an adjustable shoulder harness which allows wearer the free use of his hands.

Note compactness of this portable searchlight now in use by Berlin firemen. Shoulder slings free the wearer's hands.

Idaho Man Has Dachshund Horse



Unbelievable as he appears, "Shorty, the Dachshund," is a perfectly normal horse except for the shortness of his legs. His curious appearance has attracted countless visitors and made him a community favorite.

ONE of nature's most curious freaks is "Shorty, the Dachshund," a horse owned by L. J. Davenport of Anthony, Idaho. The horse is normal in every respect, except for its curiously stunted legs. This feature makes Shorty popular with children of the neighborhood—his dimensions eliminate fear of falling off his back to the ground.

U. of P. Builds 3-ton Calculator

A THREE-TON calculating machine, 24,000 times faster than the world's speediest mathematicians, is being built by engineers of the University of Pennsylvania.

More than 75,000 parts make up the machine which will be 26 feet long, 10 feet wide, and 3½ feet high. The analyzer will be used to solve differential equations which arise in electrical engineering problems and in furthering theoretical research in that particular field.

Training Merchant Marine "Admirals"

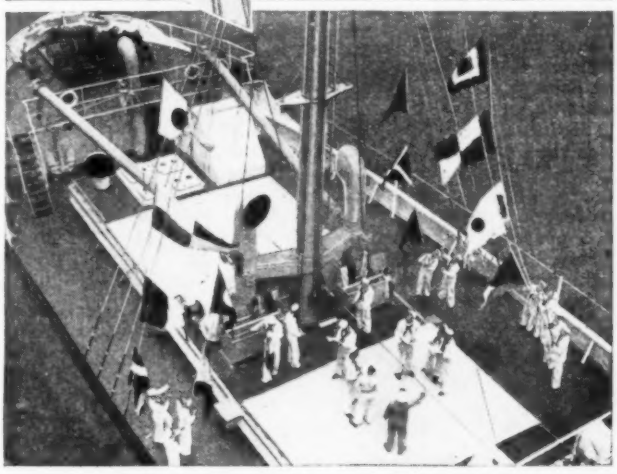
How prospective officers learn their trade at the California Annapolis of the merchant marine.

Deck cadets of the California State Nautical School engage in telescope practice as part of their training for careers as officers in the merchant marine.

Equipped with sextants, prospective officers are learning navigation secrets aboard training ship.

FUTURE officers of America's great merchant marine no longer need to stand a long and sometimes haphazard apprenticeship "before the mast," to learn the higher mysteries of seamanship. Today, the lad with the lure of the sea in his blood may learn the tricks of his sea-going trade in one of the most unique institutions in the world.

Located in Marin county, the California State Nautical School trains candidates for the merchant marine much as West Point and Annapolis fit them for military service.



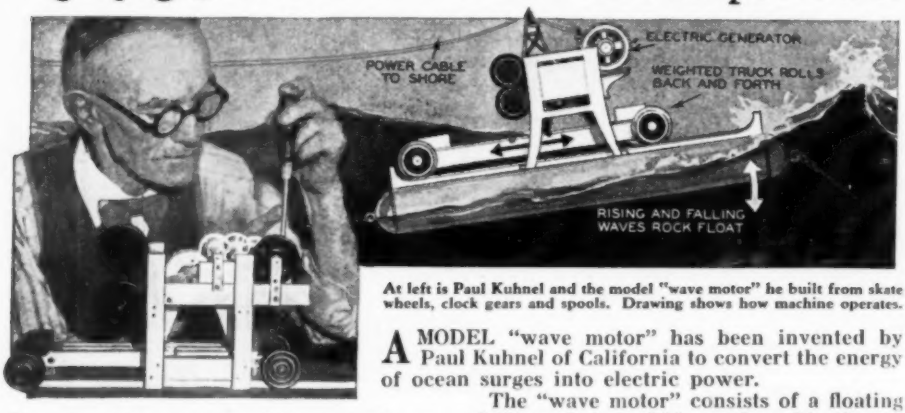
Thorough instruction in signaling and use of the flag code is part of the course. This group is shown aboard the "Golden State," preparing for their examination.

Deck cadets, for example, are thoroughly grounded in the theory and practice of navigation, seamanship, cargo handling, ship construction and stability. Prospective marine engineers undergo a course in shopwork, drawing, marine engines and boilers and a general study of internal combustion plants.

The training period is climaxed with a cruise in which classroom theory is put to the actual test on a vessel loaned by the Navy Department. Successful candidates are then qualified to perform the duties of junior officers on merchant ships.

Other state nautical schools are maintained by New York, Massachusetts, and Pennsylvania. In general, the course is two years and is open to young men from 17 to 21 years old. No charge for tuition or board is made to state residents, except a deposit for uniforms and working clothes.

Rocking Sea PLATFORM *Develops Power*



At left is Paul Kuhnel and the model "wave motor" he built from skate wheels, clock gears and spools. Drawing shows how machine operates.

A MODEL "wave motor" has been invented by Paul Kuhnel of California to convert the energy of ocean surges into electric power.

The "wave motor" consists of a floating platform that would be anchored in the sea and rise and fall with the ocean waves. This rocking motion rolls a weighted truck back and forth. A gear bar transmits the movement to a generator from which a power line would extend to the shore.

Kuhnel is seeking financial backing to build a full sized version of his model. It would be thirty feet long and ten feet wide. He built his model of skate wheels, clock gears and spools. Kuhnel claims the full sized "wave motor" could be built for $300.

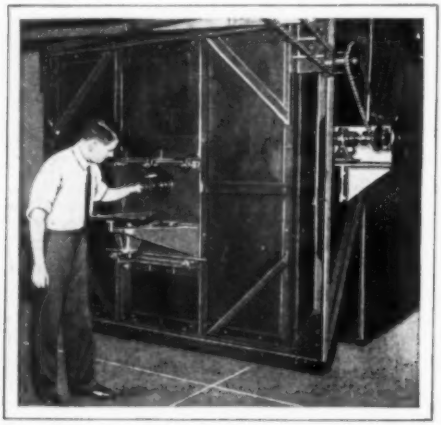
Largest Camera Weighs 14 Tons

THE world's largest camera has just been completed for the Coast and Geodetic Survey. It weighs 14 tons and is 31 feet long.

Two years' time was needed to build the camera which can take photographs with microscopic exactness. It is equipped to make nautical and airway charts with a precision of less than 1/1000th of an inch. The camera can hold plates as large as 50 inches square.

The huge box of the camera not only holds the plate, but also contains the darkroom. The operator remains inside the camera, exposing the plate and developing it before leaving.

To protect the camera from horizontal vibration it is suspended on three groups of chains from girders that rest directly on the building's foundation.



This camera is so large that the operator must work in the body of the instrument. It cost $15,240 to construct.

Truck Thoroughly Cleans Streets

This street cleaning truck combines simplicity and speed. Body is emptied by an automatic side tipping mechanism.

HAND sweepers are eliminated by a new street cleaning machine that simultaneously sprinkles the road surface, sweeps it and picks up refuse.

The revolving brush is curved so that the gutter may be swept clean. Dirt is swept inwards until it is trapped by an elevating machine that carries the refuse into a closed hopper. A sprinkler works ahead of the sweeper to prevent dust clouds. The truck operates at six miles an hour.

Army Pilot Builds Electric Bicycle from Spare Auto Parts

CONSTRUCTED of old auto parts by an army pilot, an electric bicycle is in daily use at Wheeler Field, Hawaii, for running errands up and down the mile-long line of hangars. The machine attains a speed of 20 miles per hour and may be safely ridden into hangars where fire hazards bar motorcycles or automobiles.

Power is derived from two small storage batteries and an automobile starter which is geared down to a 12-to-1 ratio.

Varying speeds are obtained by means of a pivoted tap line switch with five contact points: 8, 12 and 19 volts; one dead point and one direct short. This last contact point acts as a brake and is one of the machine's most interesting features.

Batteries for this electric bicycle are built into space occupied by motorcycle engine. The motor is below footrest.

Pencil Forms Midget Radio Set

Irene Hervey, movie actress, demonstrates the tiny crystal set which has been built into an ordinary lead pencil.

A MIDGET crystal set, built into a common lead pencil, is the technician's answer to demands for a personalized radio receiver. The crystal and cat's whisker are built into eraser end of pencil. Headphones complete the outfit. Construction plans for a similar device were carried in the May issue of this magazine.

Dry Ice Used in Shrinking Metal

EXPERIMENTS with solid carbon dioxid, or "dry ice," prove that at 112 degrees below zero, Fahrenheit, it may compete with heat as a means of securing "shrink fits" for machine parts. Tighter fits are said to be obtained by reversing the expansion-contraction process of the old method.

Wine Keg Boat to Cross Channel

A SEA-GOING adventurer from Holland who last year crossed the English Channel on a water bicycle is attempting to add to his laurels by making the passage in a wine cask. The barrel-craft carries a tiny sail and is equipped with a miniature radio set.

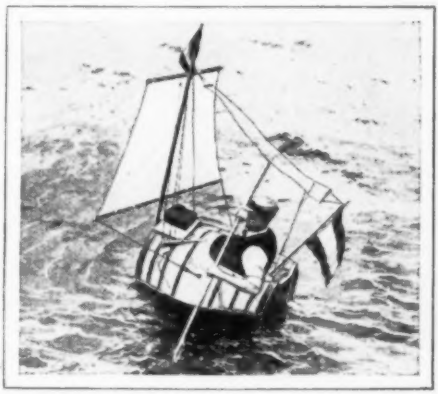
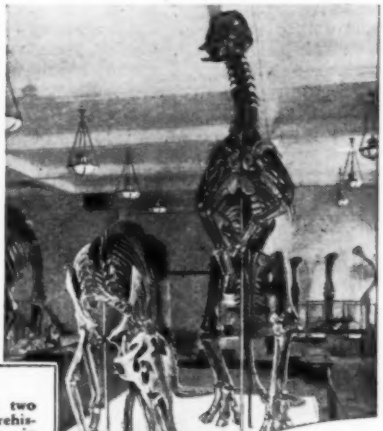


Photo shows wine-cask boat which is expected to conquer the English Channel. Note sail rigging and tiny aerial.

ROY CHAPMAN ANDREWS



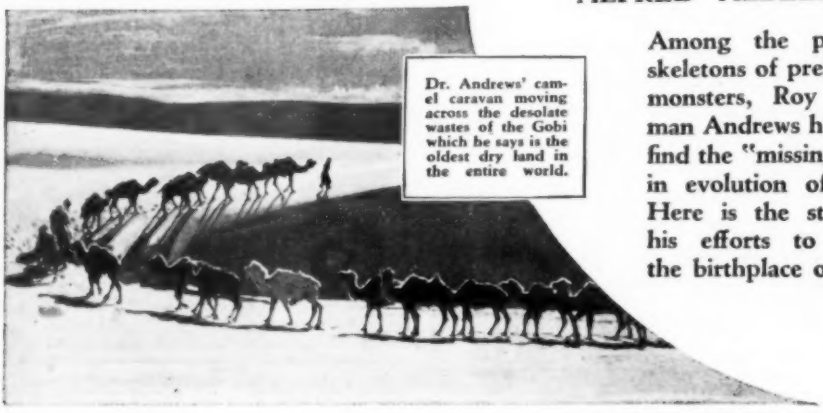
At right are two skeletons of prehistoric animals in Dinosaur Hall in the American Museum of Natural History. At left is a restoration of a stone-age mammal, the Baluchiherium. Dr. Andrews has found parts of skeletons that indicate giant animals 100 feet long once roamed the Gobi desert. Above Dr. Andrews' topographers mapping the Gobi desert.

THE DESERT MAGELLAN

by

ALFRED ALBELLI

Among the petrified skeletons of prehistoric monsters, Roy Chapman Andrews hopes to find the "missing link" in evolution of man. Here is the story of his efforts to locate the birthplace of man.



Dr. Andrews' camel caravan moving across the desolate wastes of the Gobi which he says is the oldest dry land in the entire world.

Hunter of Stone Age Mammoths

DR. Roy Chapman Andrews is the world's outstanding explorer seeking, not new lands, but the secret of the beginning of life on this planet.

Most of his adventures have been in the Gobi Desert of Central Asia. That is home ground to him. It's the birthplace of Adam and Eve too, he says. Eggs—big dinosaur eggs, the first ever found by man—were discovered there by him. They were 95,000,000 years old.

He spent ten years in five different expeditions to the Gobi plateau. His biggest prize was the skull and skeleton of the mammoth Baluchiherium, largest known mammal.

The vast sand mountains of the Gobi, he explains, have the secret of man locked in their interior. "When we solve the mystery of the Gobi Desert," he adds, "we will have the answer to the riddle of man's birth."

Dr. Roy Chapman Andrews was the first to find the eggs of dinosaurs. He is shown above with eggs believed to be 95,000,000 years old. They were found in the Gobi.

The explorers at left are carefully searching the ground for evidences of remains of prehistoric life. Dr. Andrews believes the site of the Garden of Eden is in the Gobi.

In tents pitched on the desert Chinese taxidermists, employed by Dr. Andrews, try to assemble the bits of bone found by the explorers. Such work results in very important finds.

Strife in China, which controls the Gobi, today keeps this Magellan of the drylands out of the land of his heart's desire. At the present time he is Acting Director of the American Museum of Natural History in New York City.

Dr. Roy Chapman Andrews was born 50 years ago in Beloit, Wis., where his father was a country doctor. He learned to handle a rifle at an early age. By the time he was 10 he was skilled at skinning and stuffing birds. He spent four years at Beloit College and then took post-graduate work at Columbia.

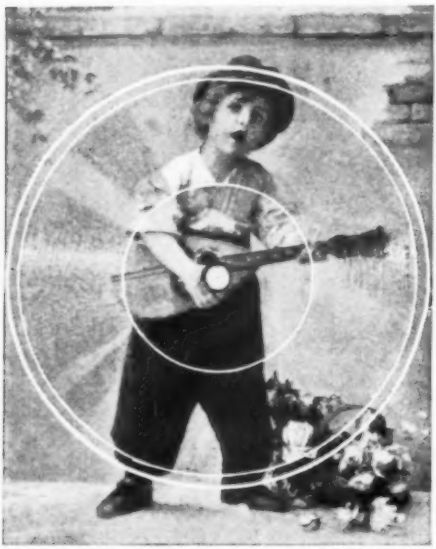
He worked his way through Columbia stuffing and mounting animals. After four years at Columbia, he faced the uncertain future. What to do? His ambition was to become a member of the staff of the American Museum of Natural History. "Why, I'll even scrub floors to get in here," he pleaded with the Museum's curator. He did. His first job was mopping up the floors in the taxidermy department.

His rise was fast. They gave him a chance working with birds and flowers in the museum. Then they allowed him to spread his territory on expeditions galore.

He went first to Alaska in 1908. Then followed Dutch East Indies, Celebes, Borneo, and North Korea in rapid succession. He went back to Alaska for whales. He studied whales until he knew as much about whales as Albert Payson Terhune does about dogs.

(Continued on page 122)

Photograph Records Both Portrait and Voice



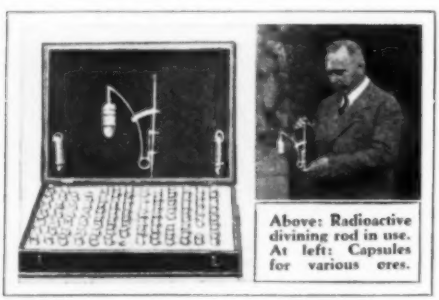
White lines indicate size of record on novelty "talking pictures." Voice record is made after the photograph is developed. The cards are popular for personal greetings.

Divining Rod Tunes in on Ore

DEVELOPED on radioactive principles, a new divining rod has been perfected to tune in on underground minerals and water.

The device, invented by Walter Henning, German engineer, consists of a vertical axis and horizontal arm from which a capsule is freely suspended. Into this capsule is inserted a given substance, which is said to respond to the radiations of the mineral sought.

According to the inventor, the divining rod performs as soon as it comes near to the metal sought. It will point to the ore deposit, then turn on its axis, the number of turns indicating the depth below the surface where the ore can be found.



Above: Radioactive divining rod in use. At left: Capsules for various ores.

RECORDS of both the portrait and voice of subjects are the latest novelty photographs on the market in Germany.

The paper on which the photograph is printed is also grooved for phonograph recording. After the photograph is taken and the print is made, the subject can transcribe his voice on the photograph without damaging the picture.

The novelty photographs are especially valuable for sending "talking pictures" to friends and relatives in distant lands and cities. The photographs are of average size and carry a voice recording of approximately three minutes' duration. The center is punched so that the record can be used on any phonograph.

Dry Ice Makes Breath Visible

Eleanor Hunt, actress-wife of Dr. Frank G. Nolan, demonstrates her husband's invention for making breath visible in movie snow scenes. She is also shown holding the device.

MOTION picture directors can produce scenes in any climate by means of trick settings and clever mechanical devices. Critics have charged, however, that some snow scenes lacked realism because they lacked the usual phenomenon of breath becoming visible upon striking cold air.

Dr. Frank G. Nolan, Hollywood physician, has solved the problem. He has invented a device for motion picture actors that makes their breath visible in "frozen North" scenes taken in the sunshine of California. The device is similar to a dental plate and fits over the teeth of the actor.

The secret of the invention is that it enables the player to hold dry ice in the mouth without harmful results.

America Demands NEW INVENTIONS *Improved* ELECTRICAL *Appliances Needed*

The modern housewife is waiting, checkbook in hand, to reward the inventor whose electrical appliances will simplify her tasks and bring her added leisure. Questions regarding patents and inventions will be answered by the Patent Editor, Modern Mechanix and Inventions, 529 South Seventh Street, Minneapolis, Minn. State your problem clearly, enclosing a stamped, self-addressed envelope. Send no models.

PROGRESS marches on! One sure index of industrial activity in this country is the Patent Office Gazette. When the Gazette is thin, the inventors of the country are idle and industrial research is at low tide. During the last few months, however, the weekly issues of the Gazette have been growing larger and larger as the Patent Office staff gears itself to the quickening pace of new inventions. Untold wealth lies in these new ideas. Contrary to the general opinion, most of the articles that we use today are crude and unperfected. They await the touch of genius that will increase their efficiency and usefulness.

Bridge Table With Co-ordinated Legs

Take the ordinary bridge table as an instance. Laboriously we take it from the closet and manipulate each leg, until the four legs are in position. Why does not some inventor give us a bridge table with the legs so co-ordinated that when one leg is brought to the open position, the other three legs will follow? Here is a fortune, like the ripe plum of the tree, waiting to be plucked.

Neon gas lamps are used for aerial beacons because of their ability to penetrate fog. Why cannot these lamps be applied to the automobile? Many accidents are caused on foggy nights because of the low efficiency of ordinary lights. We need a cheap auxiliary neon stop light that can be switched on for such use. If the high-voltage current for this purpose can be generated by some new and simple method, the inventor will reap a handsome fortune.

Electric Blackboard Erasers

There are several thousand schools in the United States that would buy several hundred thousand electric blackboard erasers if those erasers were self-cleaning and more efficient than the ordinary device. In short, they would have to produce a clean board quickly and the current would have to be automatically turned on when the teacher picked the device up. The article should retail for about five dollars and operate on an electro-magnetic basis.

Those who have tried to follow a pencil mark on a board while it is being sawed would appreciate some little gadget attached to the saw which would automatically remove the saw dust. The device should sell for a quarter and should be slipped onto the saw in a jiffy.

We need an electric lawn sprinkler that will double or even triple the efficiency of the present water-operated devices. The sprinkler should be operated by a fractional horsepower motor and it should cover a wide area, enabling a small lawn to be covered with one sprinkling.

(Continued on page 142)

Speedboat Pilots Spear Balloons at Mile-a-Minute Clip

Photo shows harpoonist about to spear one of the balloons which must be broken on each lap of new speedboat race.

NOT content with the ordinary thrills of speedboat racing, pilots have added a new complication—spearing balloons at high speed.

According to the rules of the new sport, each contestant must race around a mile course, spearing a balloon on each lap. If the harpoonist misses, the boat must be whirled about for a new shot and the balloon broken before the pilot may continue the next lap.

In order that spectators may have a good view of the proceedings, the balloons are hung from a wire across the starting line directly in front of the grandstand.

Science Takes Itch From Undies

NON-ITCHABLE underwear is the latest contribution of science to man's comfort. Old style woolens which once tortured tender skins have been outmoded by a new process which removes irritating fibers. In addition, the new treatment prevents shrinking of the garments and adds a luster to the material.

Photo-Cell Measures Starlight

WINKING, glimmering star beams that defy measurement by the human eye meet their match in the photo-electric telescope, developed and perfected by Professor Joel Stebbins of the Wisconsin University.

Changes in intensity of starlight coming through the telescope lenses vary the minute current passing through an electric eye mounted on the eyepiece. Powerful vacuum tube amplifiers pick up this current, calibrate it, and finally record it. Even errors due to stardust in the heavens are detected and measured.

Prof. Joel Stebbins seated at 15" telescope in observatory at University of Wisconsin. Amplifiers are last word in instruments for searching distant heavens.

Star Golfers Learn From Robot

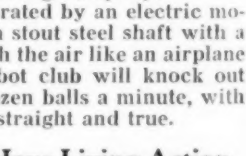
Left to right: Al Watrous, Bobby Jones, Tommy Armour, Billy Burke examine driving robot used to test golf balls.

BOBBY JONES, Tommy Armour, Billy Burke and Al Watrous received a new slant on an ancient game when they examined a driving machine perfected by a golf ball manufacturing company.

The robot is operated by an electric motor which whirls a stout steel shaft with a mallet head through the air like an airplane propeller. The robot club will knock out as many as two dozen balls a minute, with every drive going straight and true.

Flying Lures Have Living Action

AMONG the new game fish accessories is a lure which flies and flutters in a remarkable imitation of living flies and swimming insects. These lures may be used as a fly, on or near the surface, or with sinker attached, for deep-pool fishing. The lure has a buoyant cork body.



Note revolving body and wings which simulate flying action.

Fool-proof System Controls Drawbridges

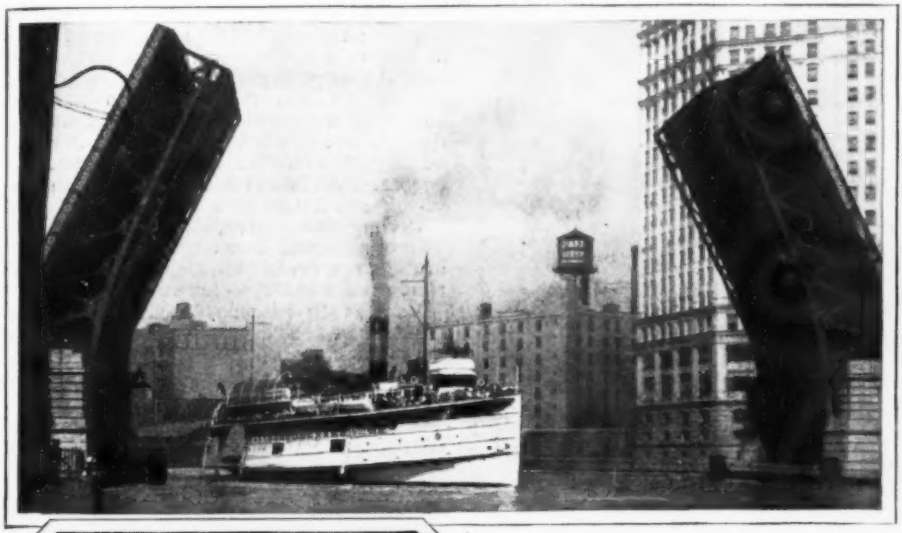


Photo above shows an incoming lake steamer passing under the massive 2500-ton spans of one of Chicago's drawbridges. These bridges lift only at certain hours to avoid holding up the heavy streams of traffic passing to and from the crowded Loop district.

In preparation for his day's work, a Madison Street bridge tender checks over the massive gears in the tower house.

With hands and feet manipulating the intricate controls, an operator hoists the mammoth span. The phone is used to check steps with companion tender across the river.

HOOTING tugs and wallowing freighters, plowing sluggishly through the Chicago river, set in motion an intricate series of mechanical operations which lift the massive drawbridges; yet behind the ease with which the great spans rear into the sky lies a remarkable fool-proof system which checks all human error.

A bridge tender doesn't just move a single lever to lift his 2500-ton span into the air. First he sounds a warning gong, then presses a series of buttons to lower roadway and sidewalk gates for oncoming and offgoing traffic. Another movement lowers a barrier cable which will stop a 5-ton truck at 30 miles an hour.

Keeping in touch with his fellow bridge tender across the river, the operator then unlocks the steel horns which hold the two spans rigid. A control lever then swings the span majestically into the air. If the bridge rises too rapidly, a huge emergency brake is used to check the momentum.

Throughout the entire operation the bridge tender keeps his foot on an automatic release brake. If his vigilance relaxes, even for an instant, allowing his foot to slip off the brake pedal, the movement of the bridge is automatically halted.

Once the boat has passed through the span, the operating movements are reversed in sequence. A single omission halts the entire process.

Magnifying Eyes Enable Expert to Write on Grain of Rice

Holding a grain of rice with a pair of tweezers, Larry Anderson, without the use of glasses, inscribes characters so small that they cannot be read by the naked eye.

WORDS and characters so small that the naked eye cannot read them are easily written on grains of rice and salt by Larry E. Anderson without the use of glasses or optical aids of any kind.

Anderson has developed his curious hobby to a remarkable degree. Using a special, fine-pointed pen and holding his writing "surface" rigid with a pair of tweezers, Anderson has succeeded in inscribing 53 letters on a single grain of salt.

His greatest achievement to date in the field of microscopic writing is the lettering of the word "coin" 802 times on a grain of rice, a total of 3208 characters.

Experts attribute his unique ability to the fact that he has "magnifying eyes," an optical phenomenon permitting a focus which enlarges objects ten times their normal size.

Students Build Hydrofoil Boat

BUILT by students of an Ohio high school, a new hydrofoil craft may revolutionize the small-boat industry.

Radical in construction, the new boat resembles a streamlined bullet, with a pronounced taper from bow to stern. Skimming along on a wing-shaped hydrofoil placed amidships, the craft is expected to attain a speed of fifty miles per hour.

Completely enclosed, the pilot's compartment is located in the bow of the boat. An outboard motor, placed in the "well" at the stern, furnishes the motive power. Steering control is effected through the use of a "joy stick" of the type used in airplanes.

Photo shows the hydrofoil boat built by students of Rocky River High School, Ohio. The craft is steered with an airplane joy stick and is powered by an outboard in the stern.

Mine Gold in Back Yard of Mint

THE West's most unique mining enterprise centers in the back yard of the abandoned U. S. mint at Carson City, Nev.

For many years sweepings, ashes and broken crucibles were thrown into the yard, and with them small quantities of gold dust—not much, but enough to lead a Carson City man to bid $190 for the mining rights.

Gold mining under way in the back yard of U. S. mint.

Electric Cells to Trap Speeders

SCIENCE has punctured speeders' alibis with a device which registers speed of passing cars with indisputable accuracy.

The scientific speed trap consists of two photo-electric eyes which stare across the road at two parallel light beams. As passing cars intercept the beam of light, an electrical contact is broken.

The speed of the car is then measured on delicate instruments which convert the time required to cover the distance between the eyes into terms of miles per hour. The instrument, successful in actual tests, was designed by Massachusetts highway engineers.

Roundtable Stove Latest of Kitchen Aids

SCISSORS SHARPENER with carborundum stone gives correct bevel to blade.

LADDER CHAIR

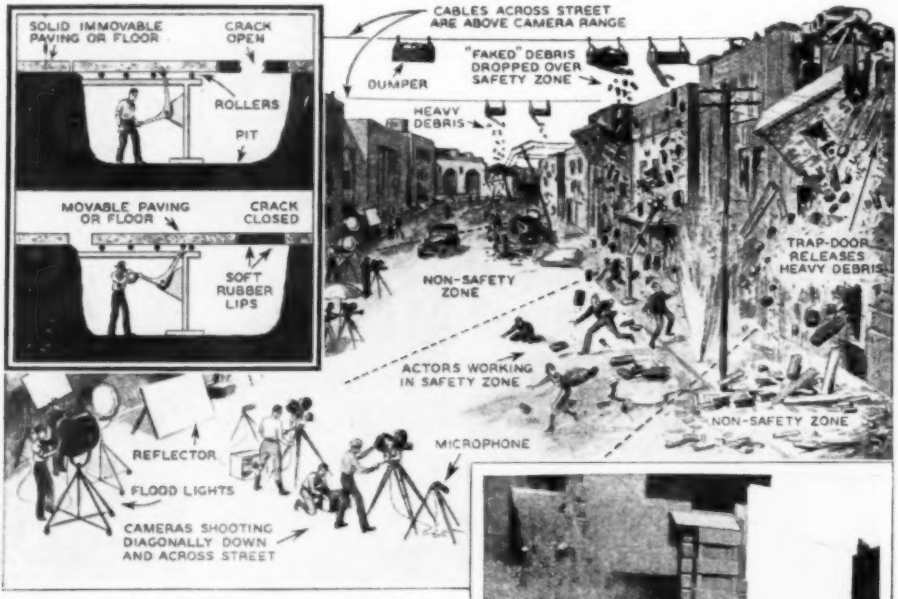
saves time and space in kitchen. Hinged joints make it possible to use device either as comfortable chair with back rest, as handy step ladder about kitchen, or a sturdy ironing board. Chair is now being manufactured by an Ohio furniture company.

JUICE extractor screws into fruit to form spout through which juice can be poured.

ROUND STOVE

developed in Germany is accessible from all sides. There are 7 electric heating plates built into top.

MAKING REALISTIC



While heavy debris and buildings crash all around them, actors perform in the less dangerous safety zones as shown in above drawing. Inset diagrams show how large cracks in pavings are controlled by a man underneath the walk.

by **JAY CHAPMAN**

Western Editor, Screen Book Magazine

LIKE a nightmare, the earth shudders. The inertia of vast weights is overcome. Buildings sway visibly. Cornices fall. A rumbling, grinding, creaking sound swells into a confused uproar. In this confusion suddenly arise the screams of humans. It is an *earthquake!*

Indoors, after the first rattling and falling of loose objects, a creaking begins, like that in a railway carriage rounding curves at high speed. Cracks appear on walls, dust begins to fall. Building structures, resisting the first efforts of the quake, weaken and yield. Wood splinters, steel groans under misplaced weight; walls buckle and debris falls in violent confusion.

Persons who have lived through major earthquakes have, years later, emerged from modern talking moving picture theaters white and trembling, convinced that the screen with its improved technique can reproduce earthquakes as realistically as Mother Earth's own violent shudders. Recent earthquake pictures give the person who has never been in such a catastrophe an actual idea of what it is.

This photograph taken on location in a movie earthquake scene shows how debris is controlled. Man on roof in distance pulls wires opening traps which release debris.

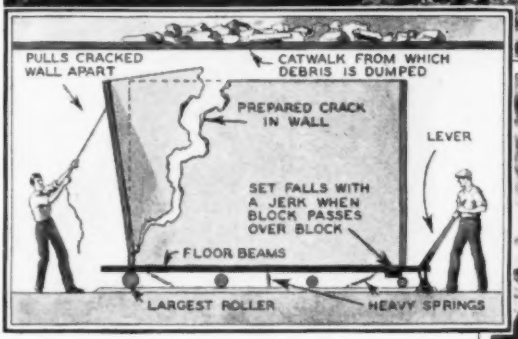
Viewing these screen quakes, the spectator wonders how such destruction can be accomplished for the camera's eye; how players and film extras can escape injury and death in making the scenes. They also wonder whether alert news cameramen have not recorded some of the actual quakes in progress.

Actually the movies make use of only certain brief glances of spectacular wreckage photographed after real quakes. The thrilling, horrifying scenes are produced through the ingenuity of movie technicians who create an actual destruction as great as that seen in real earthquakes. The actors are never in great danger. "Safety zones" protect them. In these zones the debris that falls is composed of paperlight balsa wood, hollow paper blocks of realistic-looking granite or cement, bricks of cork.

Movie EARTHQUAKES

Here is a story revealing secrets of producing terrifying earthquake scenes for the movies.

This movie scene is as realistic as an actual earthquake. Opposite page reveals how it was produced.



Interior scenes showing walls cracking and debris falling are ingeniously created by rocking the set on eccentric rollers, pulling walls apart and dropping debris on scene.

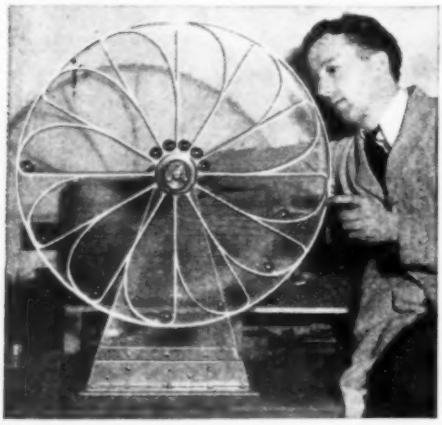
This actress registers terror as walls crumble within the house. The falling timbers are constructed of paper.

Just outside these safety zones, tons of real masonry, beams and other debris crash to the ground with thunderous impact, for the benefit of sound recording machinery and background realism. Some of the most effective outdoor camera shots are taken through a rain of heavy, dangerous falling debris, with the focus set on a zone of relative safety where the actors perform. Just behind this is another dangerous zone where heavy walls buckle and cave, and masonry crashes. The falling debris in all three zones is released from above, often by suspended cable traps out of the camera's range, so that the fall of the dangerous heavy material and the less dangerous artificial debris lands accurately on the designated zones below.

The collapse of walls in outdoor scenes is one of the most spectacular effects, and one of the most expensive, for it necessitates building masses of structure behind the walls, which may be seen collapsing as the walls fall. Portions of the sets behind fallen walls are sometimes left standing, so that bedrooms, living rooms, offices and stores, with tumbled contents displayed, are left

(Continued on page 118)

Impossibility of Perpetual Motion Shown at Chicago Fair



"Ball power wheel" at Century of Progress shows impossibility of perpetual motion. Balls, making wheel always heavier on left side, are supposed to turn it counter-clockwise.

A "BALL power wheel" which is supposed to turn continuously because it is always unbalanced is just one of the many interesting "perpetual motion" models on exhibit in the Hall of Science of A Century of Progress.

In spite of the fact that centuries of effort have failed to produce a single working perpetual motion machine, inventors continue wasting time and money on the idea. This exhibit is intended to show in a convincing manner just why it is impossible to construct such a device. Though many of the models run a surprisingly long time, friction eventually stops every one.

Stretch Paper to Align Typing

A NEW invention permits typewritten material to be lined up just as evenly on both sides as is the copy on this page. Typing is done on corrugated horizontal strips the width of a typewritten line, which in turn are cemented to a solid backing sheet. The copy is lined up after removal from the typewriter by lifting the right hand ends of each strip and stretching them to the required uniform width.

New typing sheets have horizontal strips which can be stretched to make copy even at both sides. Inset shows how the style of type can be changed by stretching.

Dog Shampoo Device Kills Fleas

Dog washing device attaches to any faucet. Water passes over flea-killing soap, forcing lather out to brush bristles.

THE ideal dog washer—really a shampoo spray, rinsing hose, and flea killer all in one—is now on the market. Attachable to any faucet, the device makes washing a pleasure for master and dog alike.

Water passing over a specially prepared antiseptic soap creates a rich, creamy lather, which is worked down through the hair by a rotary motion of the brush. A lever bypasses the water around the soap for rinsing.

Theater Uses Applause Meter

WHEN an applause meter is used to determine audience response in amateur theatrical contests, a good whistler can fool the instrument. It was found that a shrill whistle was equal to the handclapping of ten persons. A microphone, amplifier, and 7 sec. relay were used.

Hand Windlass Turns Paddle Wheels to Propel Boat

REPLACING the conventional oars with twin paddle wheels operated by a hand windlass, a Canadian inventor has devised a new method of boat locomotion.

Two disks, each 6 feet in diameter, are set at the stern, with the lower part of each wheel under water. Galvanized iron wings, resembling the fan blades on a windmill, are fastened to the outer edge of the disks. As these blades engage the water the boat is drawn forward.

Photo shows novel arrangement of twin paddle wheels on Canadian inventor's boat which eliminate rowing labors.

Angler Lands Fish Minus Tackle

Lack of fishing tackle doesn't bother Richard Baker, Bermuda hotel manager, who lands his catch with bare hands.

SCORNING ordinary fishing tackle, the manager of a Bermuda inn lands his finny trophies with no other equipment than his bare hands. Speed of movement and manual dexterity are secrets of the trick which the tackle-less angler learned from Japanese fishermen.

Scented Movies Will Rival Nature

CHEMICALS which dissolve upon contact with air are to be placed in the air-conditioning system of theatres to reproduce natural scents. The sensitive control of modern air systems enables operators to synchronize the odors with action transpiring on the screen.

Novel Suitcase Forms Picnic Table

LARGE enough to hold a substantial meal and sufficient table accessories for four persons, a novel suitcase now on the market can be opened and converted into a sturdy picnic table at a moment's notice. Concealed legs, which fold inside the case, are pulled out like those on a card table.

Although the table-suitcase is designed primarily for picnic parties, it may also be used for general travel purposes.

Photo shows table-suitcase set up and ready for use at picnic site. Insert reveals how the table legs fold inside, leaving storage room.

Device "Dry Cleans" Windows

Rotating mops, driven by electricity, clean glass minus fuss.

BY MEANS of an electric device which plugs into any light socket, glass and metal surfaces may now be "dry cleaned" without the use of any liquid.

The current drives cylindrical, rotating mops which clean and polish in one operation. The device eliminates streaking and the usual mess.

Electric Eye Turns on Automobile Parking Lights at Night

Mr. Caldwell points to the electric eye mounted on the rear window of his car, which turns on his parking lights at night and turns them off again when daylight returns.

THE "electric eye" saves O. H. Caldwell from getting many a traffic ticket. Although he parks his car at a suburban railroad station for days at a time, his parking lights are always on at night.

A photo-electric cell has been mounted on the rear window of his car and connected through a relay to the parking lights. When daylight wanes to dusk, the withdrawal of the natural light cuts down the electric current passing through the cell, allowing a relay to open and turn on the parking lights. With the return of daylight the relay closes and the lights are shut off.

Car on Cable Feeds Wild Birds

A FEEDING car for wild birds, now on the market, may be loaded with food at the kitchen window, and pulled out along its steel cable to a distance of 50 feet from the house.

As the birds become accustomed to eating from the car, the distance out may be gradually lessened, until the feathered visitors can be studied at close range. Pine boards painted in green and white were used in constructing the car.

Food is placed on this wild bird feeding car at the kitchen window. The car is then pulled out approximately 50 feet along its steel cable, so that birds can eat without fear.

Walk on Air With New Boots

Rubber bladders at the soles and heels of this new rubber boot are pumped up with an ordinary tire pump. Sponsors claim boot is more comfortable for walking.

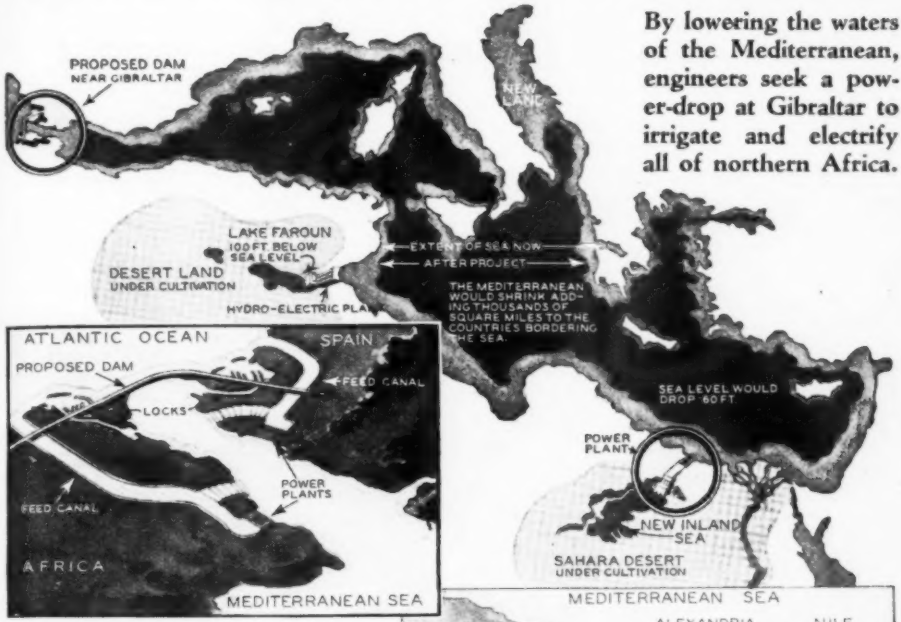
A RUBBER boot which at last enables man to walk on air has recently been perfected by an English inventor.

Rubber bladders have been built into the boot both at the heel and the sole, with a rubber tube leading from the air bladders to the top of the boot. An ordinary tire pump can be attached to the rubber tube for filling the boots with air.

Sponsors claim that those wearing the new boots get a delightful sensation of walking on air. In addition, the air cushion is more comfortable, preventing blisters.

Twin Dam Projects May Reclaim Sahara

By lowering the waters of the Mediterranean, engineers seek a power-drop at Gibraltar to irrigate and electrify all of northern Africa.



Large drawing above indicates how Mediterranean will be lowered to provide power-drop at the proposed Gibraltar dam, which is shown in the insert.

By dropping Mediterranean waters through forty miles of 40-foot tunnels into the Qattara depression, enough power will be generated in the future to electrify and irrigate all of Lower Egypt.

THOUSANDS of acres of desert land may be reclaimed, industry revolutionized and the Mediterranean coastline changed if twin engineering projects, now under consideration, are carried to completion.

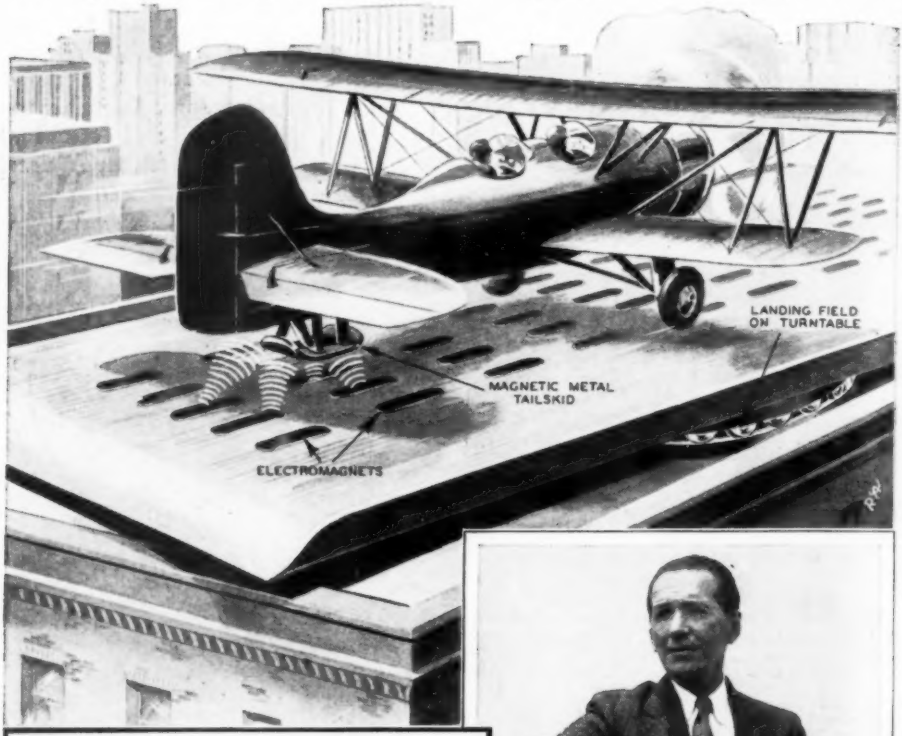
The major plan calls for the construction of a giant dam across the Straits of Gibraltar and the lowering of Mediterranean waters to provide a power-drop which would irrigate and electrify northern Africa.

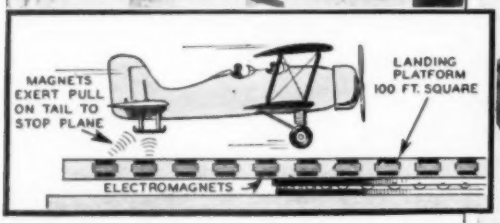
To bring the level of the Mediterranean low enough to set up a fall of Atlantic ocean water at Gibraltar, two canals are to be dug at points indicated in the large drawing above. Both canals lead into desert collecting basins far below sea level.

When the waters of the Mediterranean have been dropped about 60 feet below their present level, vast amounts of power will be available at the Gibraltar dam; and it is estimated that the problem of irrigating the Sahara will have been solved. In addition, virtually unlimited electric power will be available to industry and thousands of acres of land now under water will be opened to cultivation as the Mediterranean recedes, forming new coast line.

The secondary project is a hydro-electric scheme to supply power for Lower Egypt by bringing the waters of the Mediterranean, by canal and tunnel, into the Libyan desert, there forming a vast salt-water lake in the Qattara Depression, a huge sink about 200 feet below sea level. At the point where the water drops from the tunnels into the Qattara a power plant is to be built, whose output would render Egypt independent of imported fuels for irrigation, drainage, and various other projects.

Magnets Stop Plane on Roof Landing Field





Powerful magnets in the new rooftop landing platform are forcing the plane in the picture above to a quick stop. The cross section shows the turntable and the magnets which exert a cross-wise pull on tail skid, stopping plane.

Yosemite Nabona, a Navajo Indian, is shown above with a model of his magnetic airplane brake, which makes every rooftop 100 feet square a possible landing field.

A NEW magnetic brake makes every roof 100 feet square a possible landing field for airplanes.

With this landing platform, the invention of Yosemite Nabona, a Navajo Indian, airplanes can be brought to a quick stop in the short space of 100 feet. Powerful electro-magnets, set flush with the landing surface, exert a powerful pull on the metal tail skid of a ship, and force it to stop quickly.

The electro-magnetic braking device presents the possibility of solving the old problem of finding space for airports as close as possible to the business districts of cities.

The private plane owner, living miles from air fields, can also benefit with the invention. He can actually become an air commuter as roof sites can be selected within a short distance of his home and office.

The long magnets of the platform exert a gradually increasing crosswise pull on the plane's tail skid to bring the ship to a quick stop.

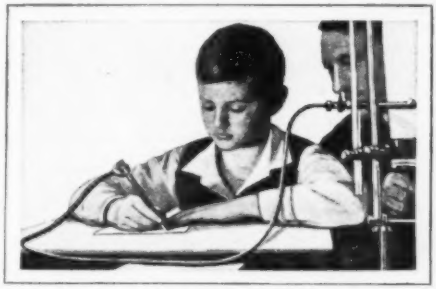
The platform is equipped with a turntable so that all landings can be made into the wind. Nabona was adopted by a German family and educated abroad.

Miracle Machine of Science Accurately Analyzes Writing

THE intuitive guesswork of handwriting analysis has been changed into an exact science by a machine known as the "graphodyne," now being used extensively by psychologists in Budapest, Hungary.

The "graphodyne" records on a moving film the pressure used in writing, the number of strokes used, and the speed of writing. A sensitive membrane attached to the special pencil transmits to the recording needle through a lever every movement of the pencil.

Doctors are finding the machine valuable in analyzing nervous patients and aiding children who stammer or have other difficulties with speech. Teachers come to the Graphological Research Laboratory with their pupils to clear up difficulties encountered in the children's studies, home life, or choice of a vocation. Thousands of tests have proved the worth of the device.



Machine invented by Mrs. Clara Roman, Budapest graphologist, analyzes child's handwriting. Recorder is at right.

Play Ping Pong Around Corner

Almost folded up on itself is this ping pong court. Instead of hitting ball over net, it is bounced against backboard, and around corner to other court. Little space is needed.

THE latest variation of the ever-popular game of ping pong should give hand ball players a decided advantage. The idea of the game is to bounce the celluloid ball off a backboard onto the opponent's court.

The two courts are set at an angle to each other and a net stretched between them to catch stray balls. The game can be played in a much smaller space than can regulation ping pong.

A white foul line on the backboard guarantees that the ball will bounce high enough for a return.

Diesel Train Sets World Records

THE Burlington Zephyr, streamlined silver bullet of the rails, shattered every non-stop rail record in its dawn-to-dusk dash from Denver to Chicago. The 1,015 mile journey was made at an average speed of 77.5 m.p.h., and the top speed 112.5 m.p.h.

Auto Radios "Jiggled to Death"

A DEVICE that "jiggles" automobile radio sets 3425 times a minute until some part gives way is being used to test the life of the new sets.

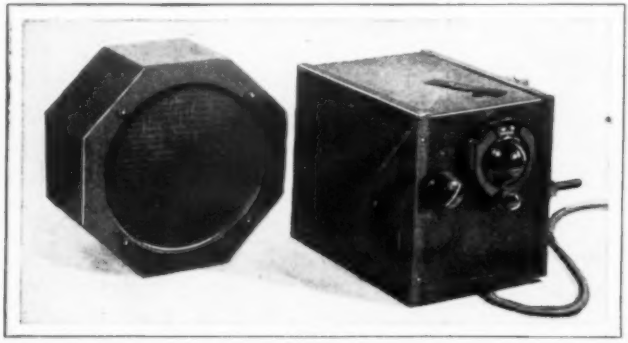
Five hours of this jiggling has been proved equivalent to 30,000 miles of strenuous driving, for each jar is equivalent to the shock received when an auto is driven over an 8-inch rut at 40 miles an hour.

There is now no need to wait two or three years to determine the effect of vibration on the operation of an auto radio set. New designs can be tested on the machine in a day, and the parts which fail first strengthened before the set is placed on the market.

Sample sets are taken from the assembly line during production and "jiggled to death" to insure uniform high quality. Any carelessness in assembling the sets is sure to show up in the test.

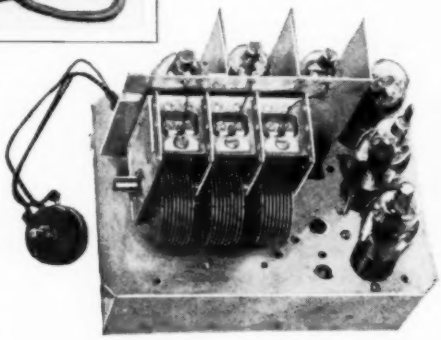
Auto radios mounted on this "jiggling table" are bumped 3425 times a minute until they stop working. Eccentric cam driven by electric motor gives movement to table.

SIX TUBE *Auto* RADIO



Save as much as twenty-five dollars by building your own auto radio. Small, simple, and inexpensive though this 6-tube receiver is, it will bring in stations thousands of miles away with loud speaker volume.

Tuning and volume control dials are mounted on end of can. Extension coupling is used on condenser rotor to permit chassis to be slid out of can. Dynamic speaker is separate.

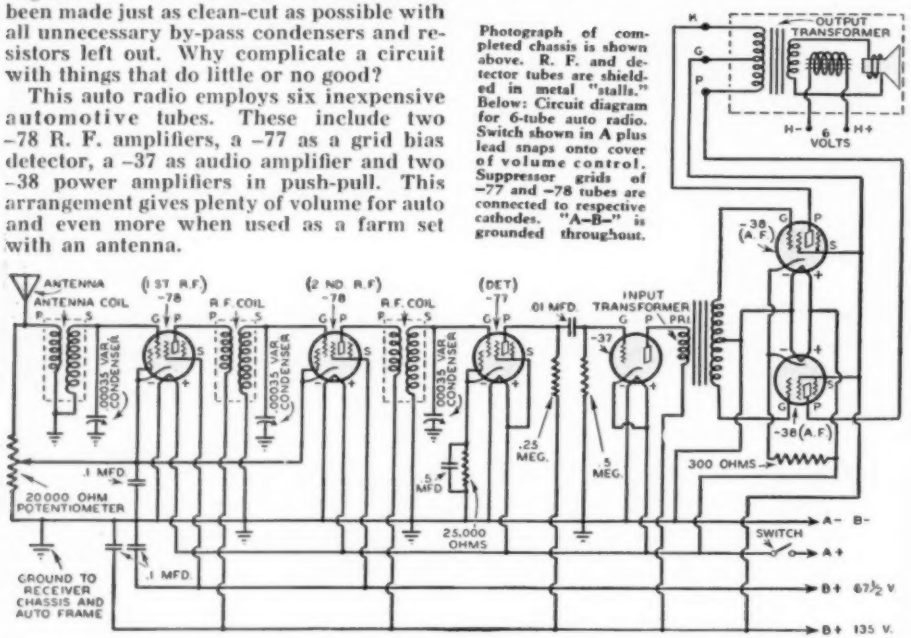


WHEN building an auto receiver several very important factors must be considered or else the receiver will be too large, not sensitive or too costly to construct. To be certain that none of these difficulties will arise, a receiver has been designed that is very sensitive, tiny, simple to construct and, most important, very inexpensive.

The average person does not want to work with complicated circuits which are even too difficult for an experienced radio engineer. In this receiver the circuit has been made just as clean-cut as possible with all unnecessary by-pass condensers and resistors left out. Why complicate a circuit with things that do little or no good?

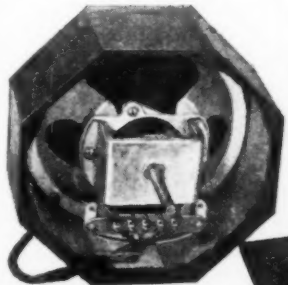
This auto radio employs six inexpensive automotive tubes. These include two –78 R. F. amplifiers, a –77 as a grid bias detector, a –37 as audio amplifier and two –38 power amplifiers in push-pull. This arrangement gives plenty of volume for auto and even more when used as a farm set with an antenna.

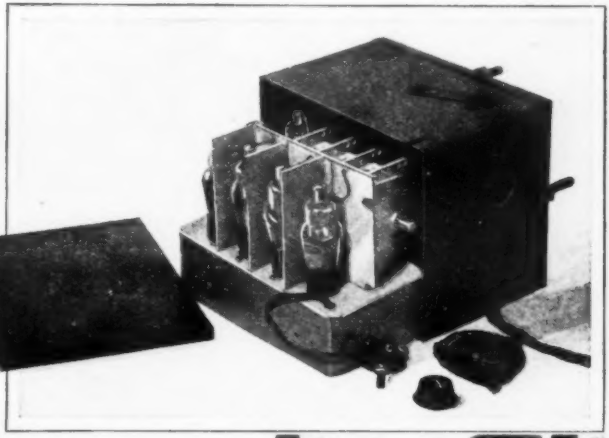
Photograph of completed chassis is shown above. R. F. and detector tubes are shielded in metal "stalls." Below: Circuit diagram for 6-tube auto radio. Switch shown in A plus lead snaps onto cover of volume control. Suppressor grids of –77 and –78 tubes are connected to respective cathodes. "A–B–" is grounded throughout.



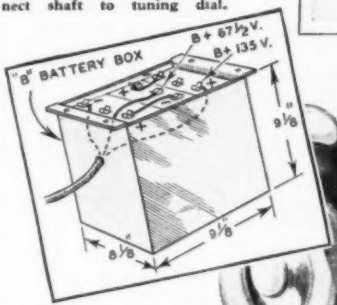
BRINGS *in* DX

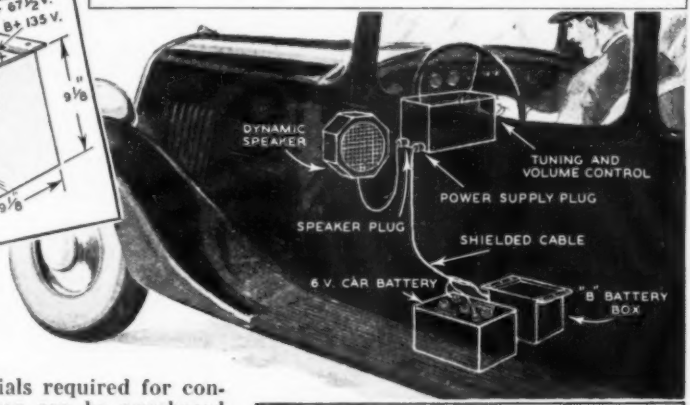
by Thomas A. BLANCHARD





Make connections to terminal panel of 6" auto radio dynamic speaker according to diagram on first page. Right: Condenser shaft is cut off so chassis will slide out of can. ¼"x¼" shaft extender is used to connect shaft to tuning dial.



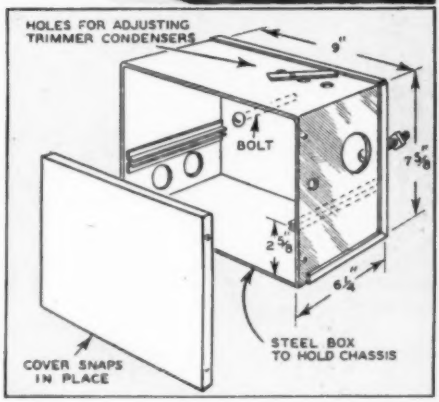


If B batteries are used, mount in metal battery box. Mount set and speaker in most convenient position in auto.

Most of the materials required for constructing this receiver can be purchased from any mail order radio supply house. The chassis and shield can can be constructed by the builder or by a tinsmith. In some cases it may be possible to secure a finished chassis from the radio supply house.

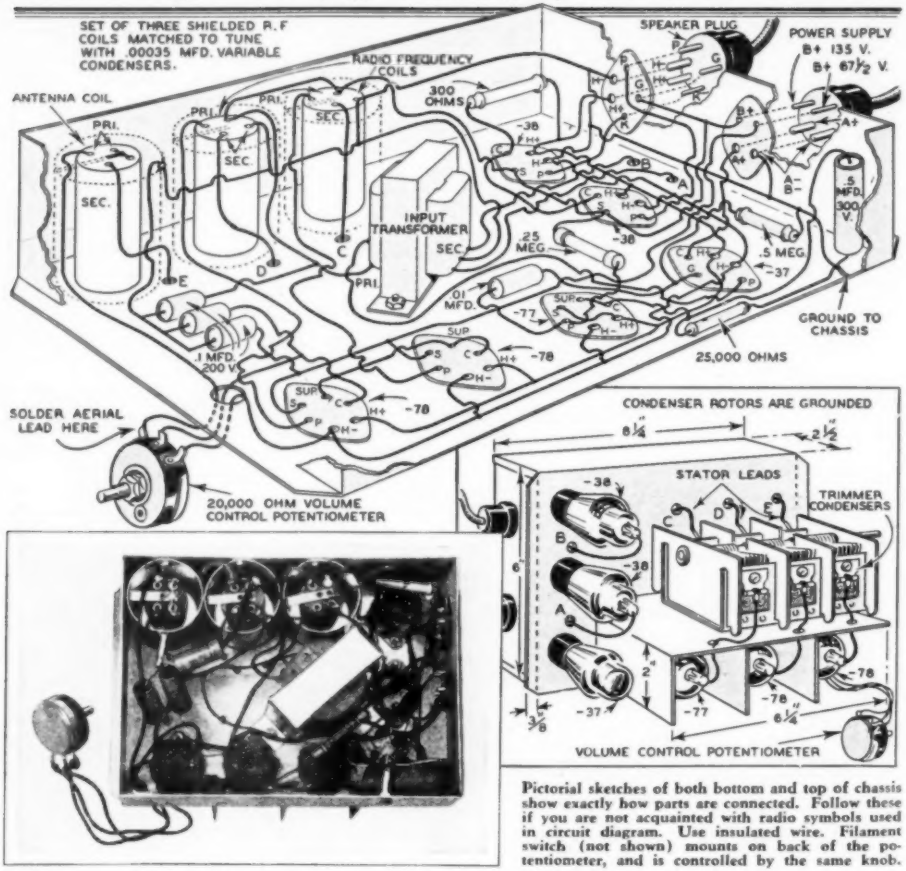
In purchasing the necessary coils be certain that they match the tuning condensers. If you are very ambitious you can wind your own coils, but it is suggested that you buy them ready made since the set of three matched coils in aluminum shield cans costs less than $1.50.

For those wishing to make their own the following is given: Secondary windings of R. F. coils—127 turns of No. 36 enameled copper wire wound on a bakelite or even cardboard form (mailing tube) 1" in diameter. The primary coil is wound over the secondary winding, separated by insulating cloth (commonly called "Empire" cloth) or "fish" paper. In the case of the antenna coil



Form can or container out of heavy sheet metal. If possible have tinsmith bend metal in bar fold to secure neat corners. Rivet angle brackets in place to hold the chassis rigidly. Punch projections on cover, corresponding dents in box.

Pictorial Diagrams Simplify Assembly of Automobile Radio Parts



Pictorial sketches of both bottom and top of chassis show exactly how parts are connected. Follow these if you are not acquainted with radio symbols used in circuit diagram. Use insulated wire. Filament switch (not shown) mounts on back of the potentiometer, and is controlled by the same knob.

Photo of bottom of chassis, showing arrangement of parts. Make all connections as short as possible, and solder neatly.

the primary winding is a manufactured type choke coil mounted on the inside of the form. A R. F. choke of 40 M.H. will be satisfactory. If at all possible it is best to use ready made coils as good results cannot be assured with homemade affairs. The coils are mounted in copper, aluminum or zinc cans size 2" in diameter and about 2½" high.

The dynamic speaker is a separate unit, since the average radio experimenter is not able to secure the midget speakers used in commercial one piece auto radios.

The power unit has also been left out of the chassis, permitting the builder to use either B batteries or a B power unit operating from the car battery, as he wishes. Plans for building your own B power unit will appear in an early issue.

The chassis is made according to the template shown. It is nothing more than a sheet of heavy galvanized iron or, better, No. 16 gauge aluminum 9"x11", with two end sections 6"x2½" for the ends. The necessary socket holes are cut out with a hole cutter, and the chassis then cut out, bent to shape, and riveted together.

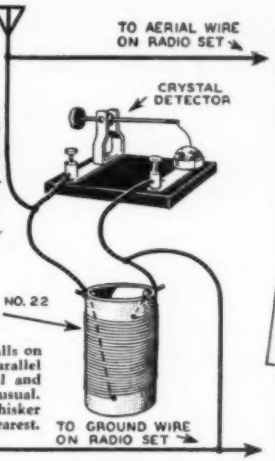
The chassis completed, construction on the actual set can be started. By taking it easy and following the pictorial diagram there will be no difficulties. First, mount the sockets. These are the wafer type which

(Continued on page 124)

BLUE LINE PRINTS for this auto radio are available at 50c postpaid. These prints will be of great help in building the set, for all diagrams are enlarged many times. A complete list of the parts needed, and instructions for making your own B power supply have been added on the blueprint. Send your order to Blueprint Dept., Modern Mechanix Publishing Co., 529 S. 7th St., Minneapolis, Minn.

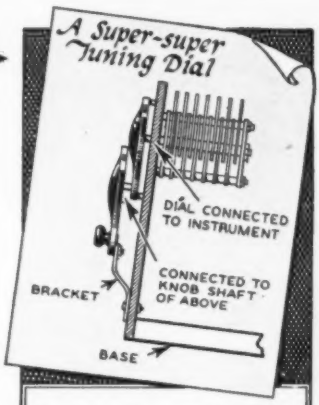
Tested Kinks Speed Experimental Work for Radio Fans

Police Call Adapter



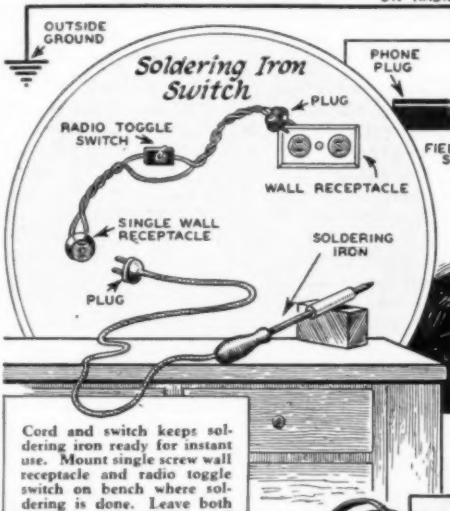
Novel coil-crystal adapter brings in police calls on many types of radio sets. Connect coil in parallel with any type crystal detector, across aerial and ground of set. Tune radio receiver as usual. When police call is received, adjust catwhisker on crystal until signal is loudest and clearest.

A Super-super Tuning Dial



Even the ordinary vernier dial is often not fine enough for tuning on certain short wave bands. This double vernier dial will do the trick. Mount tuning condenser higher than usual. Attach dial but remove vernier knob. Attach second dial to vernier shaft, mounting dial on stiff metal bracket. Crowded wave bands will be spread out greatly by the second dial.

Soldering Iron Switch

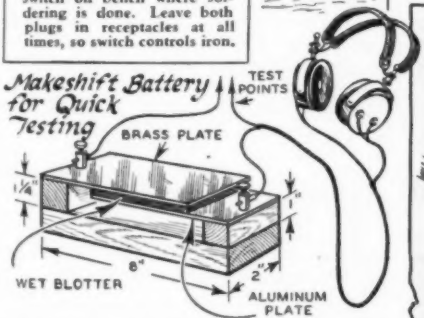


Cord and switch keeps soldering iron ready for instant use. Mount single screw wall receptacle and radio toggle switch on bench where soldering is done. Leave both plugs in receptacles at all times, so switch controls iron.

Using Headphones on Your Radio Receiver

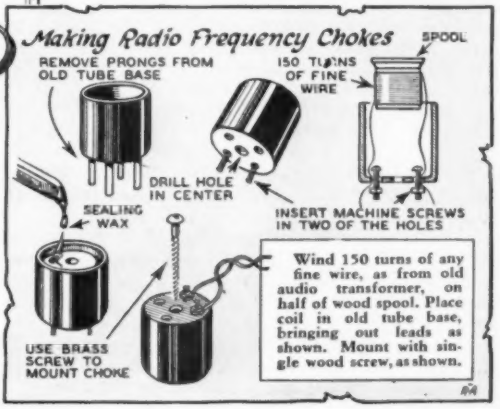
Connect phone jack in series with dynamic speaker voice coil. Since coil resistance is 15 ohms, phones 2000 ohms, speaker will not work when headphones are used on radio.

Makeshift Battery for Quick Testing



This improvised battery is ideal for testing circuits with headphones. Mount sheets of aluminum and brass as shown, pressing them together so that plain blotter just fits between. With blotter saturated with salt solution, enough current flows to make click in phones.

Making Radio Frequency Chokes


REMOVE PRONGS FROM OLD TUBE BASE
SPOOL
150 TURNS OF FINE WIRE
DRILL HOLE IN CENTER
SEALING WAX
INSERT MACHINE SCREWS IN TWO OF THE HOLES
USE BRASS SCREW TO MOUNT CHOKE

Wind 150 turns of any fine wire, as from old audio transformer, on half of wood spool. Place coil in old tube base, bringing out leads as shown. Mount with single wood screw, as shown.

FISH *in*

by ROBERT PAGE LINCOLN

Game fish move into deep, cold holes during hot days of August. Here is a thorough, instructive article on how to find and catch fish when other anglers claim "the fish aren't biting today."

Here are the best ways to locate fish during hot weather. The clocks show the best time to fish in the shallows. The sinker arrangement is best for still fishing with a bobber. The trolling rig is used for lake trout. By using the jug cool water where fish go can easily be found.

DURING the early part of the fishing season, in June and early July, the various game fish of inland fresh waters keep close to inshore waters where they feed during the morning up to ten o'clock, and in the afternoon on to the hour of dusk.

As the heat of the sun becomes more intense with the advance of the summer, the inshore waters take on a heightened temperature which becomes so oppressive to fish that they leave the shallows and pads during the heat of the day, seeking seclusion in the depths of the lake, often going down hundreds of feet to the cool springs and underwater rocky caverns. During August therefore the movements of the game fish have been changed drastically.

During the month of August fish are on the move from sunrise until about five or six o'clock in the morning. After feeding they move out into the depths. By the time the average fisherman is on the waters, at seven o'clock, the last of the bass will be disappearing into the depths. The bait caster pounds the pads mercilessly during the whole of the day.

Depending upon the weather fish stay in the depths until about four o'clock in the afternoon, when they again begin moving inshore to feed. They arrive in the shallows and in the semi-deep inshore waters just about the time the weary bait caster is ready to quit. By five o'clock a great number of the fish are in, and from then on into the night the feeding operations are on.

Members of the pike family (the great northern pike, pickerel and muskellunge), start feeding about five o'clock, but quit as soon as darkness comes on. Pike do very little if any feeding after dark. This is not true of bass, and the wall-eyed pike-perch, commonly known as "wall-eyes." Both bass and wall-eyes are nocturnal in their habits. Bass fishing is best in the month of August from the fall of dusk on to about ten or eleven at night. The same is true of the wall-eyed pike, which, unknown to the great army of anglers, forsake the deep water holes and come inshore to feed between midnight and dawn.

Since it is true that game fish seek deep water places in a lake during the heat of the day, to locate these spots is to increase your chances of getting a good catch. If a lake is fed by bottom springs it is almost certain that the fish will seek such places, for here the water will be cool and of the right temperature.

Lake trout, which come to the surface and feed around the reefs and rocks in com-

Deep Water During August

paratively shallow water during spring, leave the shallows before the heat of summer becomes too great. The trout go step by step deeper in the water, keeping just below the temperature limit. Thus in the month of August you are likely to take most of your lake trout at from one hundred to two hundred feet below the surface, in water having a temperature between forty and forty-five degrees.

To locate the deep holes in a lake it is often necessary to do some sounding. This merely involves attaching a suitable lead weight to the end of a line and dropping it at various points to get the depth. The line used should have depth marks along its length. Always keep a sharp lookout for sudden drop-offs, that is to say, a drop in the water from fifty or seventy-five feet to a hundred or more feet. These deep-water recesses (often among the rocks), prove to be "fish-holes" that will yield a catch almost any time in hot weather.

Once having located these "fish-holes," they should be marked so that they can be found easily. You can mark the spot approximately by lining up with one tree on one shore and one on another, and one tree or house on still another quarter and a house on the other, the lines crossing to mark the center which is your fishing place. But this is only an approximate location. You may fish twenty or thirty feet away from the hole and not take a bass, and yet fish on the right spot and you will take one after another.

A buoy can be used, fashioned of light wood preferably cedar round, the size of a barrel head. A ring is seated in its center, a wire of stout proportions is attached to that, a heavy weight or "anchor" is attached to the wire and it is dropped to the bottom. Enough slack is given the anchor wire so that a three or four-foot rise of the waves will not put a strain on it or drag the anchor.

The trouble with a visible buoy is that other fishermen will see it, and, instantly recognizing what it is for, will fish there, and, being successful, will tell everyone else about it. To sink your buoy below the water is, therefore, the logical thing to do,

(Continued on page 130)

Robert Page Lincoln, the author, caught this fine lake trout with the trolling rig described in the article. The rig makes use of a three-way swivel to which the main line, bait line and anchor line are attached. Below—a scene on Lake of the Woods, on the Minnesota-Canadian border, as anglers load their canoes for a fishing trip in the North Woods.

ANGLERS

Packsack Hints for Hikes Through the Woods

If you are planning on hiking for days through the woods, follow these hints on selecting your pack and fitting it for the trail.

WITH the coming of late summer and autumn the outdoor minded person turns his attention to packsacks and methods of carrying his camping outfit on long hikes through the woods. The woodsman knows the amateur at a glance, not only by the means in which he carries his equipment, but by the arrangement of it and the selection of the equipment.

In the eastern half of the country methods of carrying outfits are far different from those of the north. There it will be found that various types of knapsacks are used. The so-called Adirondack pack basket is also found as far north as Maine and eastern Canada. A pack basket is excellent where the outfit to be carried is small.

In the north woods the packsack is the rule. The typical packsack of the north, invented long ago by a man named Poirier, is the most useful of all packsack types. This Poirier or Duluth type of packsack, which is made by several manufacturers, had its inception in a homemade carrying device that was used by the lumberjacks and woodsmen. In its simplest form it is a hundred-pound canvas grain sack which had two improvised strap loops attached to it, one to go over either shoulder.

The arranging of your outfit in the Duluth packsack is not difficult to understand. It must be remembered that all hard or cornered items going into the packsack should not lie next to the back for obvious reasons. To properly load a packsack fold the camp blankets almost the width and length of the packsack. Place the packsack on the ground, back to earth, and then tuck the blankets in to lie flat at the back. The harder objects are then put down in the bottom of the sack, remembering, however, that those items needed during the day, and especially at the noon meal, should be lodged close to the top so that they can be removed without taking everything out of the sack.

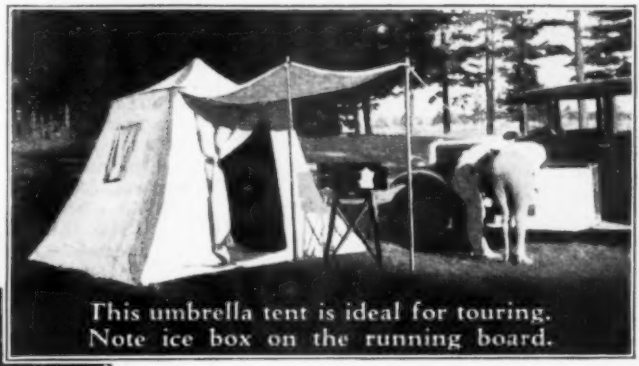
With the lower part of the sack packed, insert the cook kit in its canvas slip near the top, with the shelter tent roll on top of that. When thus packed, throw the flap down over the outfit and draw the straps tight. The larger types of Duluth packsacks possess a tump-strap with a canvas band in its center. The tump-strap is carried up to the forehead, the canvas band resting against the brow. This tump aids in taking the strain off of the shoulders.

On long trips into the woods where considerable provisions and other camp material must be carried, a pack-harness is used. This harness is used as a holder of the duffle bags. Duffle bags are full-bottomed canvas bags with draw-string tops, into each of which bags is stuffed the provisions and other items. Provisions such as rice, flour, etc., are lodged in separate canvas bags. The duffle bags are arranged on the pack-harness. A pack-harness and duffle bags are usually selected for long trips of a month or more where one does not have access to stores or trading posts.

Here is Robert Page Lincoln in the North Woods with the Duluth type of pack sack described in the article. Note that this sack has a tump strap fitting around head.

Valuable Tips on Selecting Your Motor Camping Tent

Before making or buying a tent for auto camping follow the advice given here. This article foresees problems that come up on road.



This umbrella tent is ideal for touring. Note ice box on the running board.

Useful trunk for the entire outfit.

WHETHER you buy your auto camping tent or whether you make it yourself, one important point must be recognized. The tent should be of the best of material, for the best is the cheapest in the long run. Only the best grade of canvas will stand the wear and tear and the abuse of many seasons of touring.

The style of tent that is best is open to individual preference. The fact that the so-called umbrella type of tent is found on camp grounds throughout the country, is proof of its adaptibility to conditions and its great value in motor camping. It provides a maximum of room for cots and the camper's equipment.

Not all umbrella tents are provided with a sewed-in floor canvas. You will find a canvas floor will add greatly to the comfort of motor camping trips. If your tent does not have one, it is easy to sew one in. The canvas used is generally about 8-ounce material and should be waterproofed.

Do not get an umbrella tent that is too small. A tent that is 9½ feet square in floor dimensions is about the best for two people, or two adults and two children. Size 11x11 will be found best for four adults.

There are two types of tents in the umbrella type division, the center-pole tent and the poleless tent. The poleless tent eliminates the center pole and by doing so gives greater freedom within.

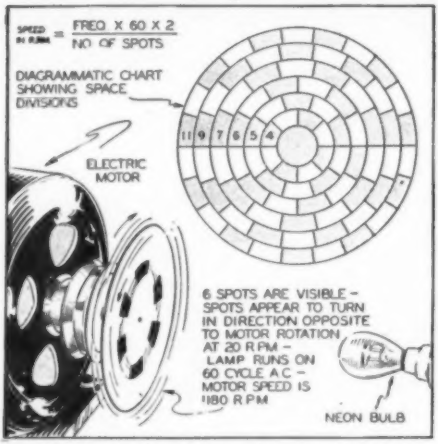
The tent should have two bobbineted windows, provided with storm flaps of the latest design which can be drawn close and will shut out all rain and wind. The doorway should have a mosquito netting (bobbinet). Some tents have a canopy front which is brought up to the roof of the car and is tied at each corner on the other side of the car. Some tents are also provided with drop sides of canvas which attach to the canopy. Under this roof the cooking can be done.

How to Waterproof Your Tent

Most tents, as they come from the manufacturers, are waterproofed. If not they can be waterproofed with a mixture of paraffin. Melt the wax and pour it into gasoline, one part and a half of wax to three parts of gasoline. Have the tent stretched tight and as soon as the mixture is stirred, paint it on the canvas with a broad paint brush. The gasoline evaporates, leaving the wax in the pores of the canvas. The hotter the day this is applied the better.

Use steel tent pegs instead of wooden pegs. Instead of the canvas loops to receive the pegs around the tent edges sew in one-inch harness rings. Sew the rings to the tent with shoemakers' thread.

Measure the Speed of Motors With Ordinary Light Bulb


SPEED IN R.P.M. = FREQ. X 60 X 2 / NO. OF SPOTS
DIAGRAMMATIC CHART SHOWING SPACE DIVISIONS
11 9 7 6 5 4
ELECTRIC MOTOR
6 SPOTS ARE VISIBLE – SPOTS APPEAR TO TURN IN DIRECTION OPPOSITE TO MOTOR ROTATION AT 20 R.P.M. – LAMP RUNS ON 60 CYCLE A.C. – MOTOR SPEED IS 1180 R.P.M.
NEON BULB

Equation at upper left gives speed corresponding to number of spots visible. Frequency is 60 cycles per sec. in U. S. Ink design shown above on cardboard disc, and fasten to motor shaft with bolt or glue. Use long filament, low wattage clear glass bulb. If neon tubing or neon glow lamp is available, it will give clearer pattern in daylight. Four spots show best for speeds from 1600 to 2000 r.p.m.

A CARDBOARD disc and an ordinary electric light bulb may be used to measure the speed of any type of motor.

Draw equally spaced black areas on a cardboard disc as shown. Center the disc carefully on the motor shaft and fasten.

The pattern may be painted directly on the flywheel or any other rotating part when measuring speeds of engines.

Light up the rotating disc with a light bulb which is connected to an a.c. supply. A shadowy pattern of spots will be seen to either stand still or slowly rotate. Count the number of spots, and time with a watch the rate at which they rotate.

Compute from the given equation the speed corresponding to the number of spots. This is the correct motor speed only if the spots stand still. If the pattern rotates in the same direction as the motor add the apparent speed of the pattern to the speed obtained by the equation. If the spots move in the opposite direction, subtract their speed.

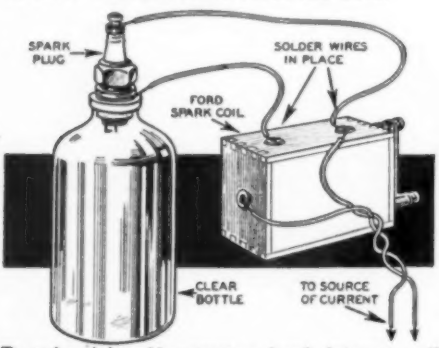
Making Nitric Acid Out of Air

THIS interesting experiment takes nitrogen out of the air to form nitric acid.

Wash and dry thoroughly a clear glass bottle with a large mouth. Wrap the end of a spark plug with rubber and push into the bottle mouth. Connect the spark plug to a Model T Ford spark coil.

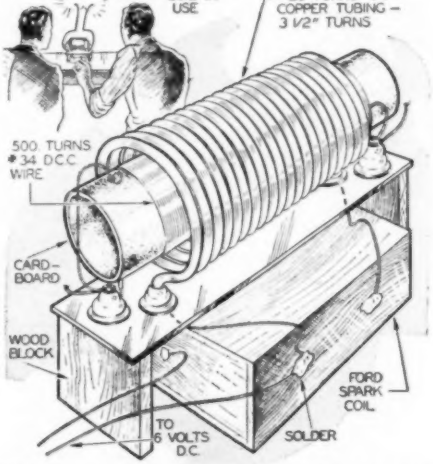
After current has passed across the plug points for an hour, a brown gas will be seen in the bottle. Quickly pour a small amount of water into the bottle, replace the plug, and shake the contents. Dilute nitric acid will then be formed.

Nitric oxide gas formed by the spark cools and changes to nitrogen peroxide, a brown gas. This gas is brought in intimate contact with water to form the acid.



To make nitric acid, connect a six-volt battery to coil primary, spark plug across secondary. On some coils lower side button is primary lead. Test acid with litmus paper.

Use Ford Vibrator as Tesla Coil



High frequency coils are mounted on glass or bakelite panel above spark coil. Dry all windings thoroughly, then varnish. Make "Jacob's ladder" as shown in upper left.

ONE of the old Ford T ignition coils can be readily used for a high voltage Tesla coil to produce spark displays.

Wind a coil with 20 turns of copper tubing, mount on a glass or bakelite panel, and connect the ends to the side (secondary) terminals of the spark coil. Wind 500 turns of No. 34 double cotton covered wire on a cardboard or fiber form, and mount on the panel inside the large coil. Connect a spark gap or "Jacob's ladder" across the terminals of the inside coil.

Emergency AUTO KINKS

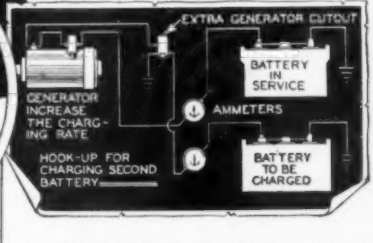
REFLECT HEADLIGHT BEAM back to supply illumination for making repairs or changing tire by holding newspaper in front of light.

CLEAN CHASSIS of grease and road dirt by spraying all parts to be cleaned with mixture of gasoline and kerosene, allowing to stand for 10 hours, then washing off with water hose.

REMOVE TUBE PATCHES which leak around edges by holding portion of tube covered by patch against hot exhaust manifold. When patch becomes heated, it can easily be peeled off, and new and larger patch applied.

APPLY CHAINS by using engine power when stalled in soft mud. Lay out chains behind wheels, then bring ends up through spokes and fasten together with wire. Turn wheels slowly in reverse to get chains on.

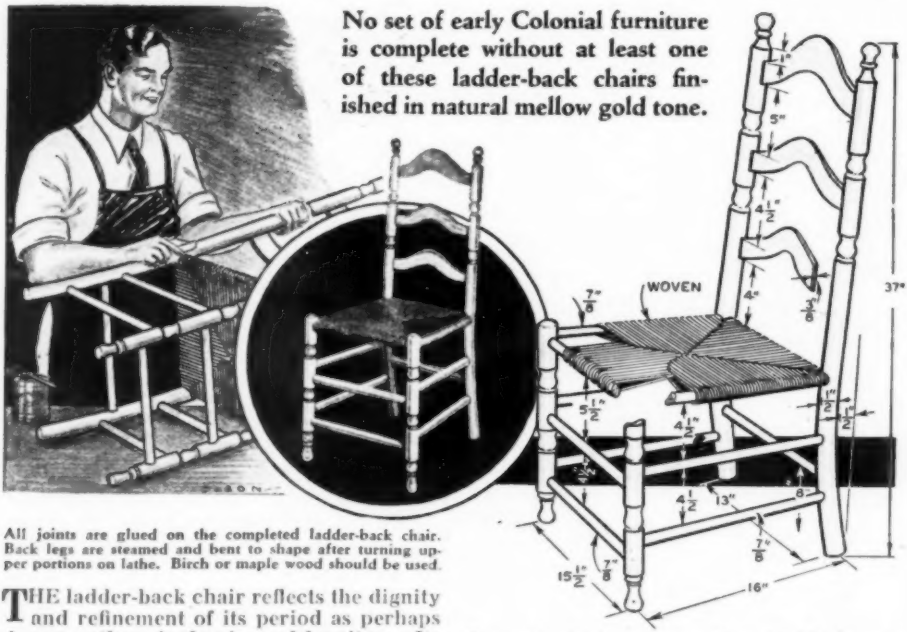
SLOW INNER TUBE LEAKS can often be permanently stopped by injecting mixture consisting of one pint of water, one cup of flour, and one level teaspoon of salt into the tube, after removing valve. Draw solution into tire pump, then force into tire.



CHARGE TWO BATTERIES on car at once by increasing generator charging rate, and connecting as shown. Radio battery can be charged while driving. Use extra cutout.

A Ladder-back Chair in Early

No set of early Colonial furniture is complete without at least one of these ladder-back chairs finished in natural mellow gold tone.



All joints are glued on the completed ladder-back chair. Back legs are steamed and bent to shape after turning upper portions on lathe. Birch or maple wood should be used.

Perspective sketch showing spacings of different parts.

THE ladder-back chair reflects the dignity and refinement of its period as perhaps does no other single piece of furniture. Its serviceability and charm has been sustained throughout the years to such an extent that its influence is still strongly felt in modern chair design.

The woods best suited for this project are birch and maple, although red gum will serve very well. Select clear, well seasoned stock of uniform color. For the back legs use only straight grained stock; otherwise cracks due to grain "run-outs" may develop while bending the wood.

Turn the back legs from 2"x2"x38" stock following dimensions in the diagram. Make all turning curves clean and uniform. To simplify the turning cut a template of light sheet metal to serve as a guide in making leg designs. Sand the legs before removing from the lathe.

Next steam the lower half of the legs until they will take a bend of about two inches. If difficulty is encountered in making a steamer simply place the legs in boiling water. Clamp the legs for the bend as shown and place near heat to dry out. Intense heat on the bended portion will insure a permanent curve. The bend when out of the clamps should be 1½".

Next turn the front legs from 2"x2"x20" stock. The template used for the designs on the back legs may be used in making these pieces. As they require no bending they are quickly made. Locate and mark rung holes in the legs, being careful that the proper angle is given them. Bore these holes on a drill press if possible, making each 3/16" in diameter by ⅜" deep. It is very important that the rungs have no twist due to crooked boring; otherwise the chair will develop a three-legged stance.

The rungs may be turned on the lathe or cut from ⅞" dowel rods of the wood used. Notice that the ⅞" rung will require a slight taper to fit the 13/16" leg hole.

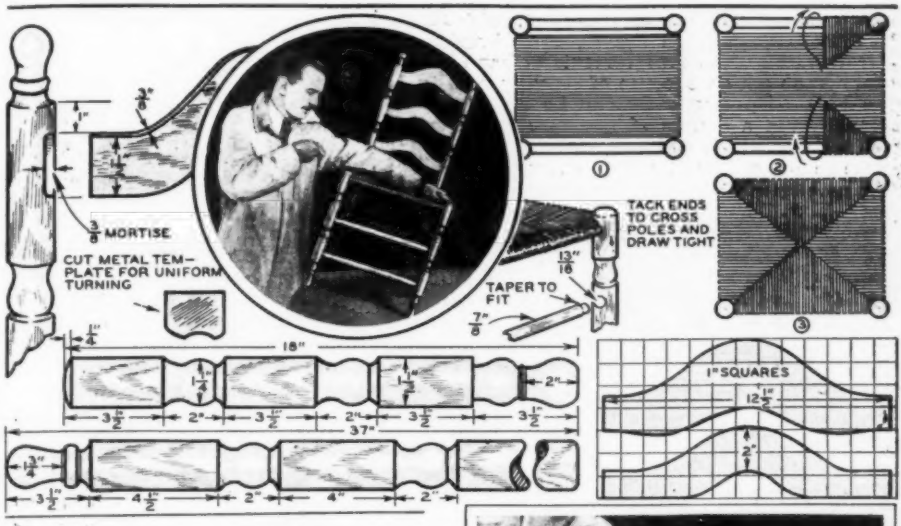
The cross slats for the back are cut from smooth ¾" stock. The two lower slats are alike and may be cut in one operation by placing the boards together and cutting from a single top pattern. The ⅜" mortise holes must have smooth straight edges as they are visible when the chair is complete. Round the edges of the cross slats slightly.

With all the pieces cut and sanded the chair is ready for assembly. Glue the back section or cross slats and the back leg rung first, then finish the assembly, drawing all joints up well and leaving securely clamped for twenty-four hours.

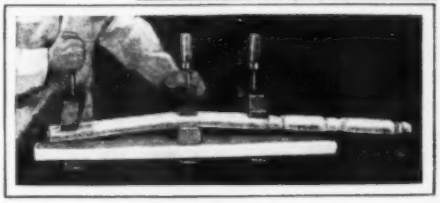
The finish may be applied either before or after weaving the seat. Its type is de-

American Design

by OSCAR E. OLSON



Carefully mortise cross slats into back legs of chair. Cut metal template as shown above to insure that turned design will be same on each leg. Leg contours shown below photo.



Method of weaving seat shown at upper right. Artificial fiber material is used. Below: Steam or soak back legs, clamp as shown, then dry under heat to form curve.

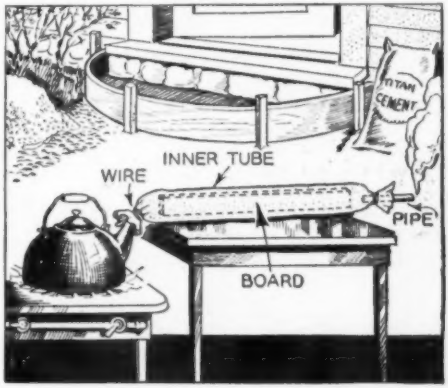
pendent upon the type of wood used in the construction. For birch or maple of even color a raw linseed oil and rubbed wax finish gives the mellow gold tone so characteristic of Early American furniture. Other woods very likely will require stain and the usual shellac or varnish finish.

The early Colonial chair makers used a hard spun rope or leather in weaving the seats. The common material used today is an artificial fiber sold under various trade names, and made especially for that purpose. The weaving is not as difficult as it might appear, for only two fundamental operations are required. Make a complete tight wrapping of the seat in one direction as shown in step No. 1, with the fiber ends securely tacked to cross poles.

The second and final step is a complete wrapping in the other direction, overlapping an additional string of the first set on either side on each successive round until the design reaches the seat center. Then reverse the skip and work the design to the corners.

To complete the seat the fiber must be sized or "fixed"; to do this apply a liberal amount of white shellac and allow to dry three hours. Follow with another like application and let dry thoroughly. The fiber will then be hard and tough and will stand an extreme amount of wear.

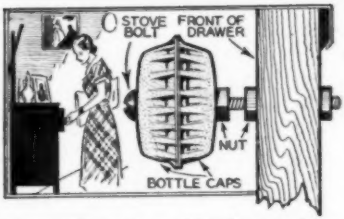
A length of inner tube attached to the spout of a teakettle will be ideal for steaming the legs of the chair. Close up the opposite end with a pipe.



Method of steaming hardwood before bending. Place short length of 1" pipe in opposite end to permit escape of steam.

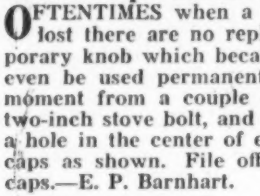
USEFUL HOME HANDIKINKS

Bottle Caps Make Novel Drawer Knobs



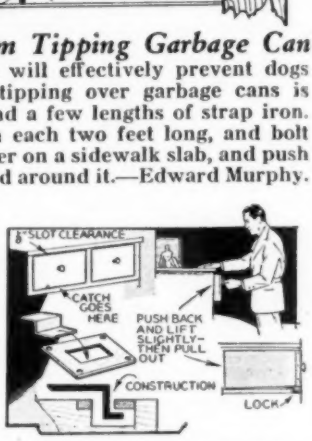
OFTENTIMES when a drawer knob breaks or is lost there are no replacements at hand. A temporary knob which because of its very novelty can even be used permanently can be rigged up in a moment from a couple of beverage bottle caps, a two-inch stove bolt, and three nuts. Drill or punch a hole in the center of each cap, and assemble the caps as shown. File off any sharp points on the caps.—E. P. Barnhart.

Frame Keeps Dogs From Tipping Garbage Can



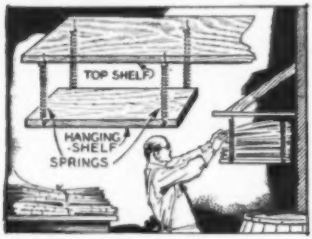
A NEAT metal frame which will effectively prevent dogs and other animals from tipping over garbage cans is made from an old auto rim and a few lengths of strap iron. Cut four lengths of strap iron each two feet long, and bolt to the tire rim. Set the container on a sidewalk slab, and push the frame partly into the ground around it.—Edward Murphy.

A Secret Drawer Lock



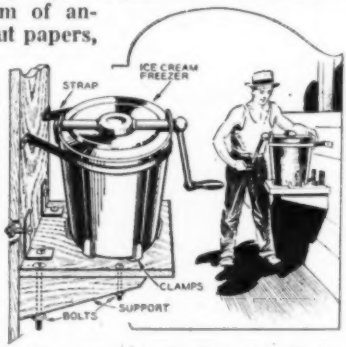
AN INVISIBLE drawer lock which requires no key, but still can be opened only by those who know how will be welcomed by many. Plane an eighth of an inch off the top front of the drawer. Flush-fasten to the bottom of the drawer frame an 18-gauge piece of metal with a slot in it, and to the bottom of the drawer fasten a lip which will just slip into the slot. To free the drawer, push back and lift slightly.—F. Weston.

Shelf for Paper



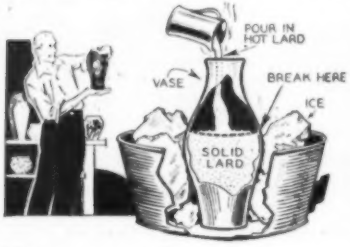
ALMOST every housewife saves wrapping paper, paper bags, and newspapers for different uses. This simple shelf will always hold the papers neatly, regardless of how many are on the shelf. Get a piece of ½" board about 10" wide by 18" long. Fasten light springs 4 inches long to each corner, and hang the shelf from small hooks screwed to the bottom of another shelf. To take out papers, merely pull the shelf down.—W. Schmidt.

Holder Keeps Ice Cream Freezer Steady



WHEN the cream in an ice cream freezer begins to harden it usually takes one man to hold the freezer while the other turns the crank. With this simple holder, however, the freezer can be mounted on a wall at any convenient height. Make the shelf of 1" boards, and hang it to the wall with angle brackets. Use wood or metal cleats to center the bottom of the freezer.—Avery Sewell.

Cutting Bottles



A BOTTLE or tumbler can be cut off at any desired point in the following manner. Fill the bottle with lard to the level you wish it cut, packing the lard firmly, then chilling it with ice. Heat more lard or fat until very hot, then pour quickly into the bottle on top of the chilled lard. After a minute or two the bottle will crack neatly, even though the glass is not smooth. Attractive vases and beverage sets can be made.—Glen Stillwell.

Midget Racer Has Free ACTION *Wheels*

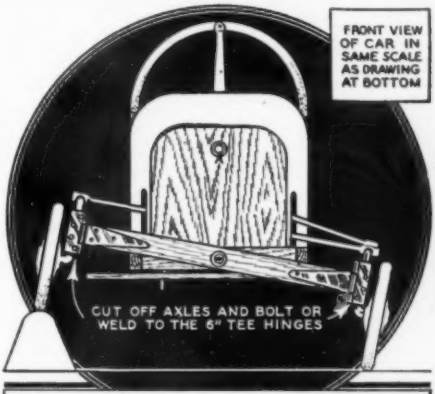
FREE action for front wheels, now so popular on modern motorcars, is just one of the many features of this inexpensive midget car. Regardless of the bumps in the road, steering is always free, and the frame of the car is not warped. With such an axle even an adult can ride along as passenger.

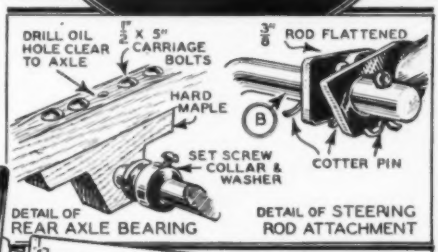
Another important feature is the positive steering control. Ordinary 6" T-hinges are used for spindles. A model T Ford steering wheel, gears, and shaft make up the steering gear, the shaft being cut to fit the car. Anchor the gear box to the cowling.

Ten inch coaster wagon wheels are fine. Cut the original coaster shaft in half, bend as shown, and bolt each half to the T-hinges.

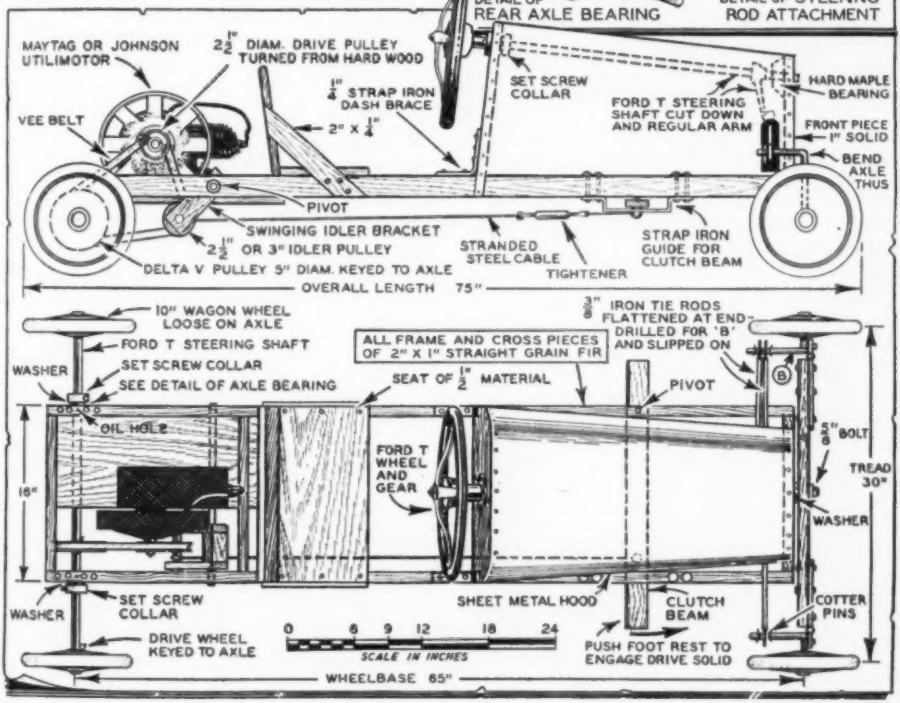
A Ford T steering shaft makes a strong rear axle if one wheel is keyed to the shaft for driving. A hard maple block having provisions for oiling will make a good bearing.

Use hard maple or oak throughout for the frame. The power unit can be any type of small gasoline engine.



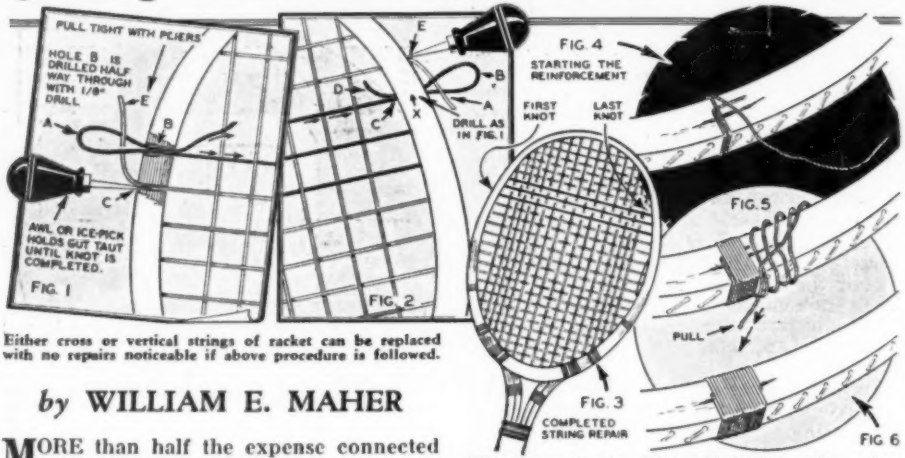


Be sure holes in flattened steering rods are large enough to prevent any binding on sharp turns. Sliding foot rest arrangement shown below acts as clutch, tightening belt.


MAYTAG OR JOHNSON UTILIMOTOR
2½" DIAM. DRIVE PULLEY TURNED FROM HARD WOOD
¼" STRAP IRON DASH BRACE
2" X ¼"
VEE BELT
SET SCREW COLLAR
FORD T STEERING SHAFT CUT DOWN AND REGULAR ARM
HARD MAPLE BEARING
FRONT PIECE 1" SOLID
BEND AXLE THUS
PIVOT
SWINGING IDLER BRACKET
2½" OR 3" IDLER PULLEY
DELTA V PULLEY 5" DIAM. KEYED TO AXLE
STRANDED STEEL CABLE
TIGHTENER
STRAP IRON GUIDE FOR CLUTCH BEAM
OVERALL LENGTH 75"
10" WAGON WHEEL LOOSE ON AXLE
FORD T STEERING SHAFT
WASHER
SET SCREW COLLAR
SEE DETAIL OF AXLE BEARING
⅜" IRON TIE RODS FLATTENED AT END DRILLED FOR 'B' AND SLIPPED ON
ALL FRAME AND CROSS PIECES OF 2" X 1" STRAIGHT GRAIN FIR
SEAT OF ½" MATERIAL
PIVOT
OIL HOLE
16"
FORD T WHEEL AND GEAR
⅝" BOLT
TREAD 30"
WASHER
SET SCREW COLLAR
WASHER
DRIVE WHEEL KEYED TO AXLE
SHEET METAL HOOD
CLUTCH BEAM
COTTER PINS
0 6 9 12 18 24
SCALE IN INCHES
PUSH FOOT REST TO ENGAGE DRIVE SOLID
WHEELBASE 65"

Measurements can be taken directly from above sketches by using scale shown below. Mount gas tank alongside motor.

Cutting TENNIS EXPENSES *in* TWO



Either cross or vertical strings of racket can be replaced with no repairs noticeable if above procedure is followed.

Wind frame of racket tightly with fishline as shown above where crack starts, to prevent enlargement and complete breakage of frame. Invisible knot in string is easy to form.

by WILLIAM E. MAHER

MORE than half the expense connected with tennis can be eliminated if proper care is taken of the equipment.

There is no need to have the racket re-strung when a few strings break. Follow the directions in Fig 1 for installing either one or more cross or vertical strings. Hole (B) is drilled half-way through its length with a ⅛" or 9/64" drill to permit the knot formed to pull out of sight inside the frame.

The broken end of the intact string is pulled tight with a pair of tape-covered pliers and kept from slipping by an ice pick. The new string is put through hole (B) from the inside and pushed back through the same hole, leaving a small loop. The loop and the broken end are now pulled into the hole.

Weaving in the New String

The new string is now woven between the vertical strings, pulled tight with pliers, and secured with a pick.

To fasten the new string the hole at (X) is drilled half-way through with a ⅛" drill. A loop is formed with the new gut in hole (X), and the other end of the old string put inside the loop.

Pull with pliers at (B) until the new string is slightly tighter than the other cross (or vertical, as the case may be) strings.

Now grip the gut tightly with another pair of pliers at (C) and press towards the frame to prevent the slack taken up from loosening. Transfer the pliers from (B) to the end (D) of the repair gut and pull until the knot is drawn into the hole. Cut off the excess gut and the repair will be unnoticeable.

Shellac the whole job, putting a few drops on the knots to prevent slippage. The completed repair is shown in Fig. 3.

With the proper care gut will last a long time. Silk gut must be kept shellacked. Use a solution of 50% white shellac and 50% alcohol and coat on the strings very thinly. Too much is worse than not enough for it cakes on the strings, causing them to become dead and lifeless.

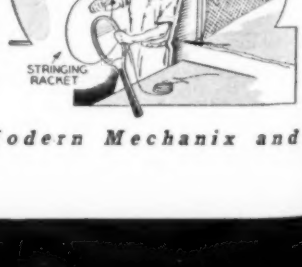
If shellacked sparingly the silk stringing will stand nearly a season of daily use where otherwise it would not last more than three or four weeks. Shellac after about every tenth set.

Lamb's or sheep's gut (more expensive and more transparent than silk) need not be shellacked so frequently; about every twentieth set will be sufficient.

If the racket is used on clay courts treated with calcium chloride to keep down dust it would be well to sprinkle the strings with ordinary talcum powder after each session of play. This will absorb the calcium chloride which would otherwise cause the strings to rot. Remove powder by wiping with a cloth, then shellac.

Gut becomes dead if it remains in a racket over winter. If gut is in excellent condition it may be removed from the racket, stored over winter in oil paper, kept in a tight tin,

(Continued on page 123)



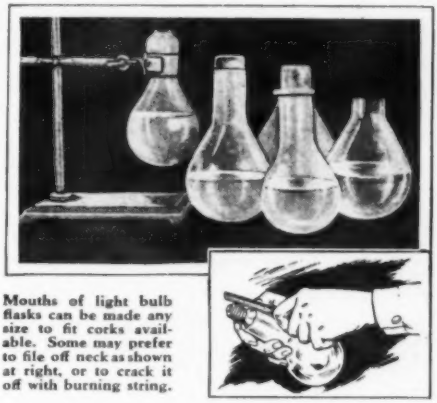
Parallel jaw pliers are best for racket restringing, but ordinary pliers can also be used if jaws are carefully covered with adhesive tape as shown at right. Gut will soon break if compressed too much by ordinary pliers.

Make Variety of Chemical Flasks From Old Light Bulbs

THE alert chemical experimenter can find many uses for flasks made from the larger sizes of light bulbs obtainable from janitors of public buildings.

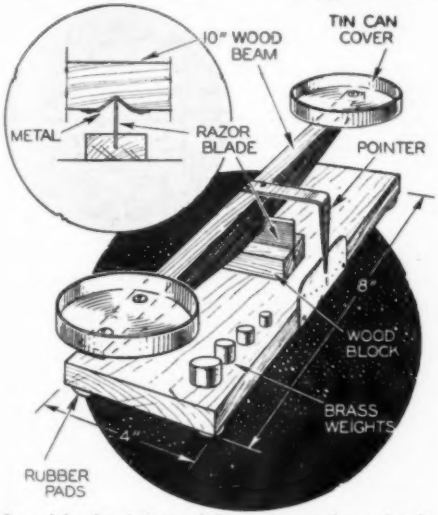
After cutting the bulb from the base, the large end of the bulb is carefully heated with a good gas burner or a gasoline blow torch until the glass is a light red color. Quickly press the bulb down on a board to form the flat base of the flask, being sure the bulb is vertical.

Instead of cutting off the base, you can peel off the brass cap with pliers, heat the end, and pull on the two wires to withdraw the core.



Mouths of light bulb flasks can be made any size to fit corks available. Some may prefer to file off neck as shown at right, or to crack it off with burning string.

Darkroom Scale Is Inexpensive



Cut weights for darkroom balance to approximate size desired, then check with standards at drugstore and file down.

A PAIR of accurate scales is essential for the amateur photographer who finishes his own work. The material needed for this ingeniously designed scale is usually available in the workshop scrap pile.

A V-shaped notch at the center of the scale beam is lined with sheet tin, to serve as a bearing surface. The balance is supported with practically no friction upon a razor blade mounted in a slotted wood block on the frame of the scale.

After making the scale and pointer, accurately balance it by adding thumbtacks underneath the balance arm.

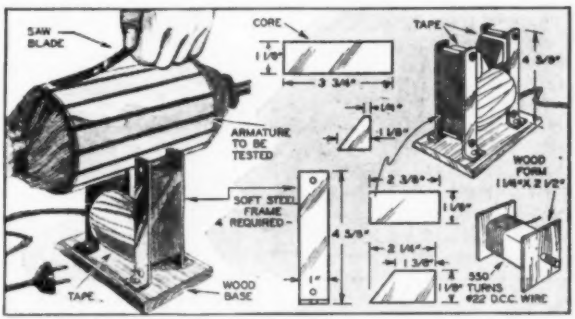
Growler Tests Small Armatures

ARMATURES of small motors and auto generators are quickly tested for reversed leads and bad coils with this growler.

The laminations are best cut on a squaring shears, which most tin shops will permit you to use. Wind the coil on a wood form 1¼" square and 2½" long on which thin cardboard has been wrapped. Tape the coil, then shellac it and assemble with the laminations.

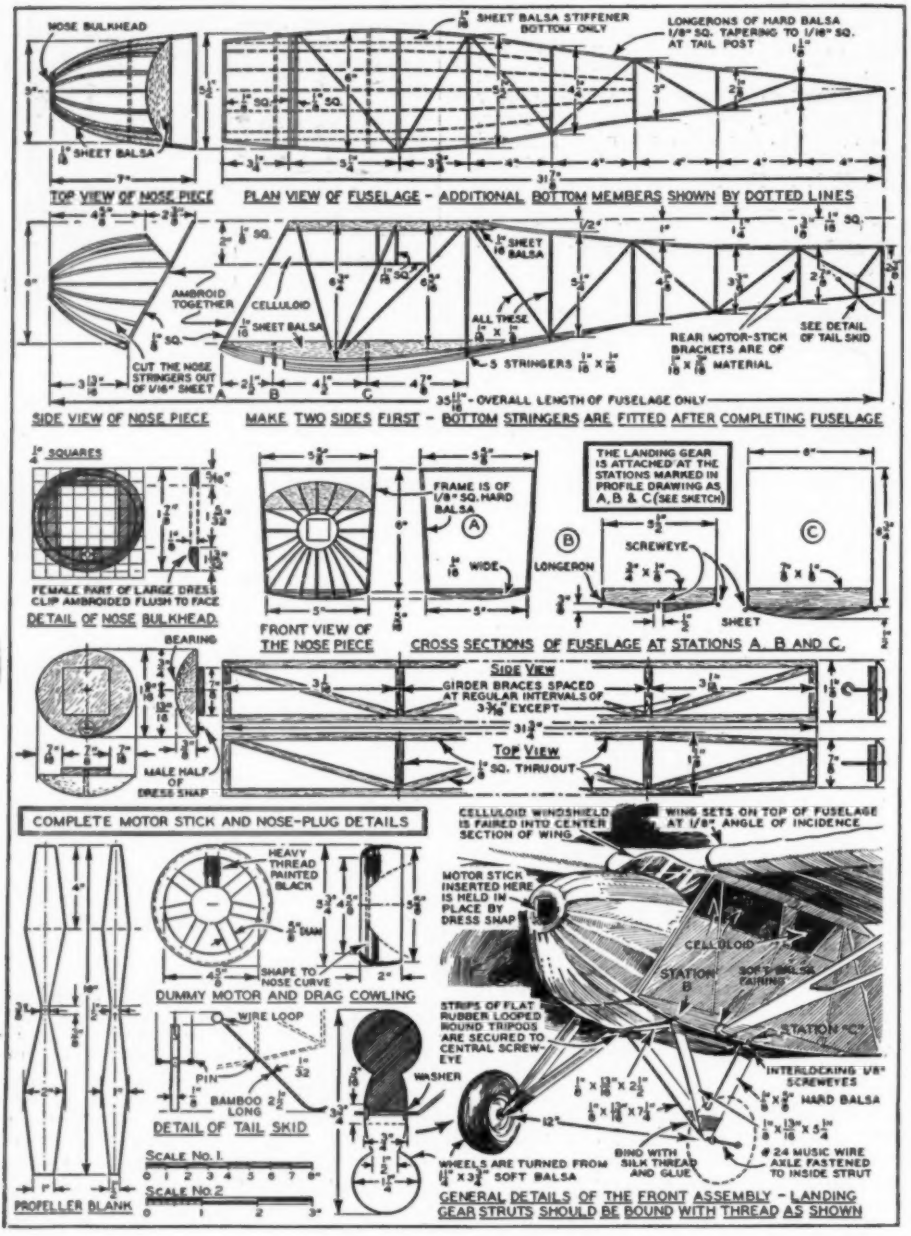
Place the armature to be tested between the sloping ends of the core. If a hack saw blade resting on top of the armature vibrates over one of the slots, there is a short circuit. If a spark occurs when any adjacent commutator bars are shorted with the metal feeler, a coil is shorted—if no spark occurs the short circuit is between commutator bars.

Reversed leads and open coils are found by turning the armature slowly while the two leads from a flashlight bulb bear on adjacent commutator segments, and noting any change in the brightness of the bulb.



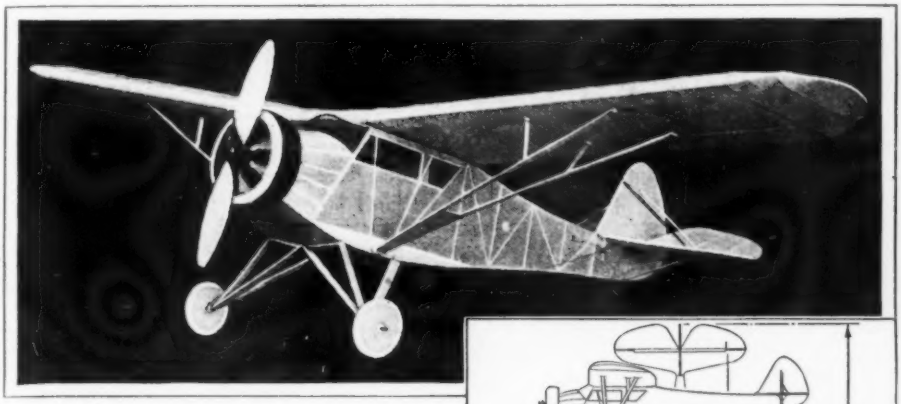
Cut laminations for armature growler from .015" transformer steel or No. 26 gauge stovepipe iron. Plug growler into 110 volts a.c. line for use.

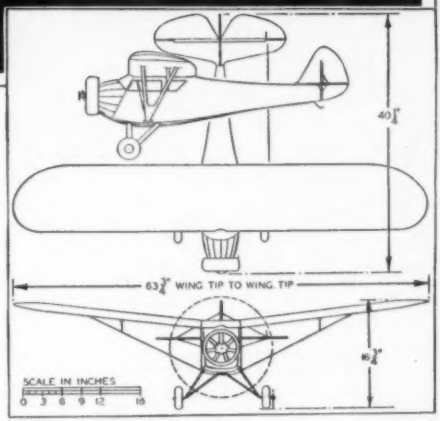
BUILD THIS FLYING


NOSE BULKHEAD
1/16" SHEET BALSA STIFFENER BOTTOM ONLY
LONGERONS OF HARD BALSA 1/8" SQ. TAPERING TO 1/16" SQ. AT TAIL POST
1/8" SHEET BALSA
TOP VIEW OF NOSE PIECE
PLAN VIEW OF FUSELAGE - ADDITIONAL BOTTOM MEMBERS SHOWN BY DOTTED LINES
AMBROID TOGETHER
CELLULOID
1/16" SHEET BALSA
CUT THE NOSE STRINGERS OUT OF 1/16" SHEET
ALL THESE 1/8" X 1/8"
5 STRINGERS 1/16" X 1/16"
REAR MOTOR-STICK BRACKETS ARE OF 1/16" X 1/16" MATERIAL
SEE DETAIL OF TAIL SKID
35 11/16" - OVERALL LENGTH OF FUSELAGE ONLY
SIDE VIEW OF NOSE PIECE
MAKE TWO SIDES FIRST - BOTTOM STRINGERS ARE FITTED AFTER COMPLETING FUSELAGE
1/4" SQUARES
FEMALE PART OF LARGE DRESS CLIP AMBROIDED FLUSH TO FACE
DETAIL OF NOSE BULKHEAD
FRAME IS OF 1/8" SQ. HARD BALSA
1/16" WIDE
FRONT VIEW OF THE NOSE PIECE
THE LANDING GEAR IS ATTACHED AT THE STATIONS MARKED IN PROFILE DRAWING AS A, B & C (SEE SKETCH)
LONGERON
SCREWEYE
SHEET
CROSS SECTIONS OF FUSELAGE AT STATIONS A, B AND C.
BEARING
MALE HALF OF DRESS SNAP
SIDE VIEW
GIRDER BRACES SPACED AT REGULAR INTERVALS OF 3 3/16" EXCEPT
TOP VIEW
1/8" SQ. THRUOUT
COMPLETE MOTOR STICK AND NOSE-PLUG DETAILS
HEAVY THREAD PAINTED BLACK
SHAPE TO NOSE CURVE
DUMMY MOTOR AND DRAG COWLING
WIRE LOOP
PIN
BAMBOO 2 1/2" LONG
DETAIL OF TAIL SKID
WASHER
WHEELS ARE TURNED FROM 1 1/4" X 3 3/4" SOFT BALSA
PROPELLER BLANK
SCALE NO. 1
SCALE NO. 2
CELLULOID WINDSHIELD IS FAIRED INTO CENTER SECTION OF WING
WING SETS ON TOP OF FUSELAGE AT 1/8" ANGLE OF INCIDENCE
MOTOR STICK INSERTED HERE IS HELD IN PLACE BY DRESS SNAP
CELLULOID
STATION B
SOFT BALSA FAIRING
STATION "C"
STRIPS OF FLAT RUBBER LOOPED ROUND TRIPODS ARE SECURED TO CENTRAL SCREW-EYE
INTERLOCKING 1/8" SCREWEYES
1/8" X 2 5/8" HARD BALSA
BIND WITH SILK THREAD AND GLUE
24 MUSIC WIRE AXLE FASTENED TO INSIDE STRUT
GENERAL DETAILS OF THE FRONT ASSEMBLY - LANDING GEAR STRUTS SHOULD BE BOUND WITH THREAD AS SHOWN

The entire fuselage and cross sections, propeller, motor, and cowling are drawn to scale No. 1. The motor stick, wheels, tail skid, and nose bulkhead follow scale No. 2. First lay out fuselage profile, full size, on a flat board. Drive brads along outline to hold the longerons in place, then carefully build up each side with struts and braces.

SCALE *Model Monocoupe*





This fine scale model, built true to scale, can be the pride of every model builder. At right are top, side, and front elevations giving over-all dimensions of the model.

by **ADRIAN C. McINNIS**

ANYONE handy with tools can easily duplicate this fine flying model Monocoupe. It performs like a real ship, is built true to scale and is capable of making flights of 300 feet.

The little ship has a wing span of slightly more than five feet and a length of 40¼ inches. It is built on a 2" to 1' scale of the 1932 Warner powered Monocoupe.

The model features a shock-absorbing landing gear and tail skid, built up wing ribs and wing spars, and a landing device which is fool-proof and causes the model to make three-point landings which are as essential in a large model as in a full size plane.

Each Section Built Separately

Before building the model you should thoroughly study the layout sheet and then proceed with the construction. Build each part—fuselage, landing gear, tail-surfaces, main wing, propeller, etc.—separately and carefully.

The first step is to lay out the fuselage profile on a flat board and drive brads in the board along the outline to hold the longerons to the proper curve. Then place all struts, diagonal braces, etc., in place and glue all the joints. After the side is dry it is removed from the board and the other side is constructed.

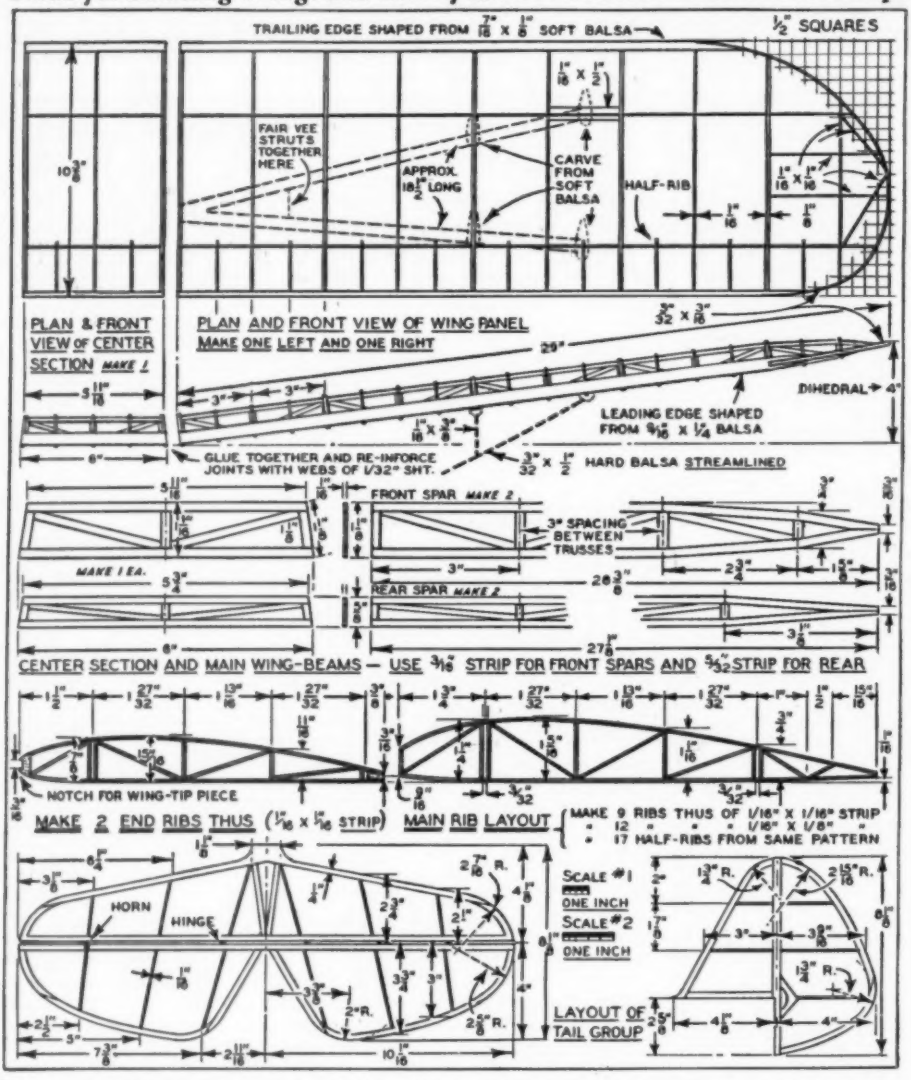
Then join the two sides together with the proper struts and diagonals. The longerons are of ¼" square, hard balsa tapering to 1/16" square at the tail post. Most of the struts are 1/16"x¼" but a few near the landing gear are of larger cross-section.

The nose of the ship consists of the nose bulkhead cut from ¼" balsa; twenty stringers equally spaced around the bulkhead and rear frame and made of 1/16" sheet balsa cut to the shape of the fuselage profile (top, bottom and sides); and the rear frame of ¼" square balsa which corresponds to the front frame of the fuselage proper. When the nose is finished and covered it is glued to the fuselage.

The landing gear consists of two inverted tripods of ¼"x13/16" and ¼"x⅝" streamlined hard balsa which are fastened to the fuselage by means of four pairs of 1/16"x⅝" screw-eyes which are inter-locked and act as hinges.

The tripods are fastened to each other and to the fuselage at their inner extremities by several loops of ¼" flat rubber which make an effective shock absorber. The wheel axles are a four-inch piece of No. 24 piano wire bent to the proper angle and glued and wrapped with thread to the landing gear. The wheels are 1¼"x3¾" and are turned from soft balsa or built up if a lathe is not available.

Plans for Building Wings and Tail of Rubber-Powered Model Monocoupe


TRAILING EDGE SHAPED FROM 7/16" X 1/8" SOFT BALSA
1/2" SQUARES
FAIR VEE STRUTS TOGETHER HERE
APPROX. 18 1/2" LONG
CARVE FROM SOFT BALSA
HALF-RIB
PLAN & FRONT VIEW OF CENTER SECTION MAKE 1
PLAN AND FRONT VIEW OF WING PANEL
MAKE ONE LEFT AND ONE RIGHT
29"
DIHEDRAL 4"
LEADING EDGE SHAPED FROM 9/16" X 1/4 BALSA
GLUE TOGETHER AND RE-INFORCE JOINTS WITH WEBS OF 1/32" SHT.
3/32" X 1/2" HARD BALSA STREAMLINED
FRONT SPAR MAKE 2
3" SPACING BETWEEN TRUSSES
MAKE 1 EA.
REAR SPAR MAKE 2
CENTER SECTION AND MAIN WING-BEAMS — USE 3/16" STRIP FOR FRONT SPARS AND 5/32" STRIP FOR REAR
NOTCH FOR WING-TIP PIECE
MAKE 2 END RIBS THUS (1/16" X 1/16" STRIP)
MAIN RIB LAYOUT
MAKE 9 RIBS THUS OF 1/16" X 1/16" STRIP
" 12 " " 1/16" X 1/8" "
" 17 HALF-RIBS FROM SAME PATTERN
HORN
HINGE
SCALE #1 ONE INCH
SCALE #2 ONE INCH
LAYOUT OF TAIL GROUP

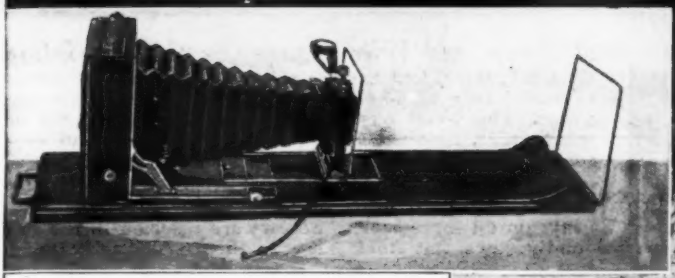
The wings and tail group are drawn to scale No. 1, while the wing beams and rib patterns follow scale No. 2. The main wing is built in three sections, the center section and the right and left panels. Build front and rear spars first.

The tail-skid is a curved piece of bamboo 1/32"x⅛"x2½" with a wire hook glued to its upper end and a bearing at its center. The stick is mounted by a pin to the bottom longerons and a piece of ⅛" flat rubber is slung through the hook and around the top longerons at the first station from the tail post. Mounted in this manner, the tail-skid is a simple shock-absorber.

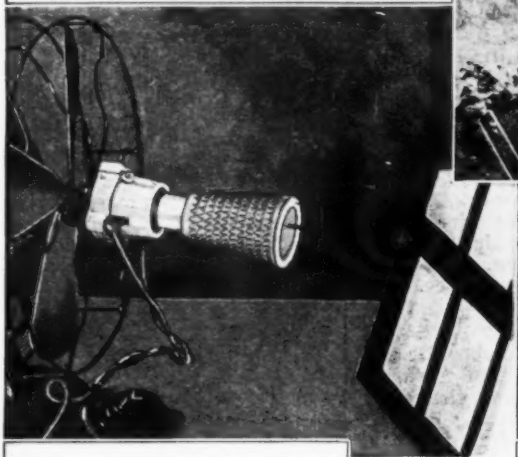
The stabilizer and elevators are built separately and are connected together with four wire hinges. Their outline is of ⅛"x¼" balsa and the ribs are of 1/16"x⅛" balsa. The two elevator stops and the horn are of 1/16" round bamboo with small wire hooks and are securely glued to the elevator and stabilizer. The vertical fin and rudder are in one piece and are constructed of ⅛"x¼" and 1/16"x⅛" balsa. The four tail braces are of 1/16"x¼" streamlined balsa.

(Continued on page 120)

PHOTO GADGETS



FOCUSING GUIDE speeds taking of perfect focus pictures of nearby objects. Mount camera on board, determine size of field at shortest focal length, and bend wire finder to indicate that field. This arrangement is ideal for photographing plants, insects, and other small objects.



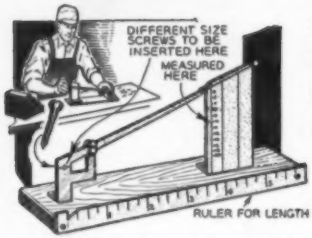
DRY PRINTS rapidly by attaching 500-watt electric heater element to front of electric fan, and directing warm air blast against prints or films mounted on drying board. Porcelain socket can be bolted to wire guard of fan as shown in above photo.

CURLING of photo prints can be cured by placing prints concave side downward on shade roller and rolling up shade. Prints will come out perfectly flat.

GLOSSY PRINTS will dry in three to five minutes if they are placed in a tray of wood alcohol for one minute, then placed on the ferrotype tins. Wash prints thoroughly before dipping them in alcohol. Plates can be dried in same manner.

HIGH-LOW light socket used with photo dark room lamp makes one light do for developing films or paper. Use low wattage bulb.

TIMESAVERS FOR THE WORKSHOP FAN

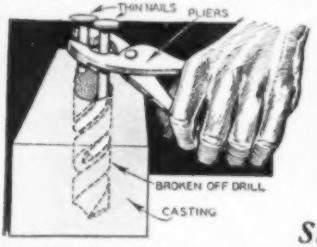


A Screw and Wire Gauge for the Workshop

SCREW, wire, and metal sizes can be accurately determined in a moment with this ingenious combination gauge. The wood base is 2"x6"x½" thick. A metal or wood ruler, notched at one end to hold the head of a screw, is fastened to one side, to determine screw lengths. Anvil and pivot arm are cut from sheet metal. Fine wire is stretched across the end of the pointer to show readings on all three scales. Screws are inserted in the "V" of the jaws, flat stock between them.—Thos. H. Duffy.

Cut Circular Glass Plates With Small Lathe

NEW clock faces can be cut perfectly circular by this novel method. Glue or cement a sheet of wrapping paper to the glass, then glue both to the lathe face plate, the paper being between the glass and the metal. Mark the diameter of your circle. Resting the glass cutter on the tool rest, press it to the glass as the lathe runs slowly. Remove the glass with a thin knife and tap out the disc very carefully.—O. E. Olson.

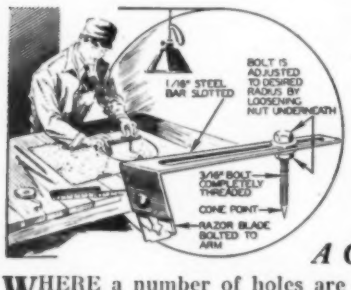


Novel Method for Removing Broken Drills

WHEN a metal drill breaks off below the surface of the work, it is often very difficult to remove it. Drive two thin wire nails down the flutes of the drill as far as possible, then twist the nails in a counter-clockwise direction. Broken taps can also be removed in this way. —George Zuber.

Stretching Springs

HERE'S a kink for putting new life in short heavy springs such as valve springs. Fasten one end of the spring to the dead jaw of a large vise with strong wire, the other end to the moving jaw in a similar manner. Now open the vise until the spring has been stretched to the desired length. An even tension is applied to the entire length of the spring.—J. W. Lawson.

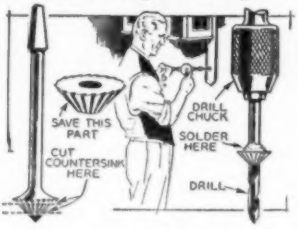

1/16" STEEL BAR SLOTTED
BOLT IS ADJUSTED TO DESIRED RADIUS BY LOOSENING NUT UNDERNEATH
3/16" BOLT COMPLETELY THREADED
CONE POINT
RAZOR BLADE BOLTED TO ARM

Cut Circular Auto Gaskets

ROUND gaskets, often required in shops or garages, can quickly and accurately be cut from paper, cork or felt with this simple cutter. Take a piece of strap steel the width of a razor blade, cut a long slot as shown, and fasten the razor blade to the other end with a single bolt. Grind bolt to point for pivot. —J. Polivka.

A Countersinking Drill

WHERE a number of holes are being drilled for wood screws of the same size, this kink for drilling and countersinking holes in one operation will prove valuable. Saw off the head of a countersink, and drill it with the drill to be used later. Solder the countersink part to the drill at a point which will just allow the desired depth of hole.—Andrew Vena.



BACK YARD FOUNDRY
Made from OIL DRUM

CUT TOP OF DRUM AS SHOWN BY DOTTED LINES
SHIM UNDER HINGE
HEAVY HINGE
PEEP HOLE
30 TO 50 GAL. OIL DRUM
STACK AROUND 12"-0" LONG — IN 3 SECTIONS — SHEET-METAL RIVET SECTIONS TOGETHER
FURNACE HOOD FROM OLD STEAM BOILER — ANY SUBSTITUTE USED SHOULD BE OF FAIRLY HEAVY METAL
CUT OPENING FOR DRAFT DOOR
CUT HOLE FOR PIPE FLANGE
DISCARDED OIL DRUM CONSTITUTES SHELL OF FURNACE
HOOD HINGE
DAMPER
4" THICK FIRE BRICK LINING WITH FIRE CLAY MORTAR
1/2" DIAM. PIPES SET AT 1" CENTERS FORM FIRE GRATES
2" DIAM. PIPE FLANGE ON EACH SIDE FOR DRAFT — APPLY PLUG LOOSELY
DRAFT DOOR MADE FROM OLD HEATING STOVE DOOR — LEAVE OPENING IN FIRE BRICK FOR DOOR
CAST IRON MELTING POT
HANDLING HOOKS 3/8" X 1-1/2" BAR
LUG
1/2" ROD

Cast iron cooking pot will do as crucible for melting yellow brass or aluminum. Fireclay or black lead crucible will have to be used for copper, red brass, or iron.

Cut peephole in hood of furnace so molten metal can be watched without lifting hood. Pipe flanges are for attaching blower; in most cases, however, ordinary draft will be sufficient. Air draft prevents metal grate from melting.

Center: A. H. Waychoff, author of article, pours at least one heat of castings a week with his highly successful furnace. He has made a 65-lb. iron casting.

ANY man can rig up in his own back yard a complete foundry for making castings as heavy as thirty pounds from brass, copper, or aluminum.

The body of the furnace is a discarded oil drum, with one end cut out.

A draft door from an old wood stove is mounted over an opening cut near the bottom of the drum, and pipe flanges are riveted over two inch holes cut opposite each other near the bottom. For supporting the hood, a heavy strap hinge is bolted to the top of the drum.

The shell of the furnace is now lined with bricks. Fire brick halves that have been thrown out by the local gas company will be ideal. Set one ring of bricks edgewise around the bottom of the drum, leaving openings for the draft door and the pipe flange holes. Cut lengths of half inch pipe for the grating and space ½" apart.

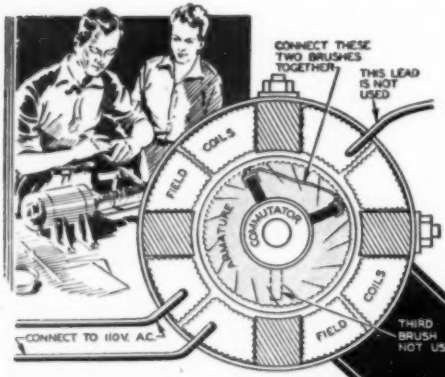
Use a mortar made of fire clay and water to keep the pipes in place and to fill in chinks in the bricks. Common clay can also be used, or a mixture made up of one part salt and two parts wood ashes, to chink in the remainder of the lining.

When the brick work has been completed, some sort of heavy metal hood with the smaller end 8 inches in diameter is fitted.

Coke is best for fuel, though coal, charcoal or lampblack briquettes may be used for melting brass or aluminum. Start the fire with paper, shavings, and wood, place a six inch layer of coke on the grate, then lower in the melting pot or crucible. Pack coke in up to the top of the pot and light.

Novel Uses for AUTO Generators

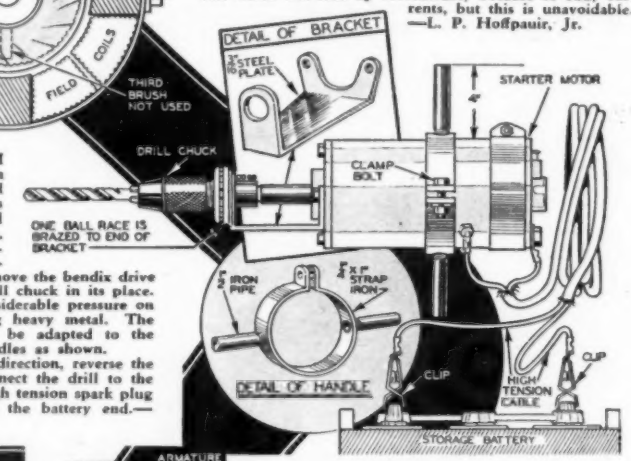
By making just a few simple changes in wiring, automobile generators and starters can be converted into useful power tools for the home workshop. Five dollars is paid for each accepted new conversion for automobile generators or starters.



MAKE 110 VOLT A.C. MOTOR—The Dodge 12-volt starter-generator or almost any other automobile generator can be made to run as a speedy 110 volt alternating current motor by following the same general procedure as is outlined here.

Clean the generator thoroughly with gasoline, then disconnect all leads to the brushes and field coils. Now locate the two leads which will place all of the field coil units in series, and connect them to your 110 volt a.c. leads.

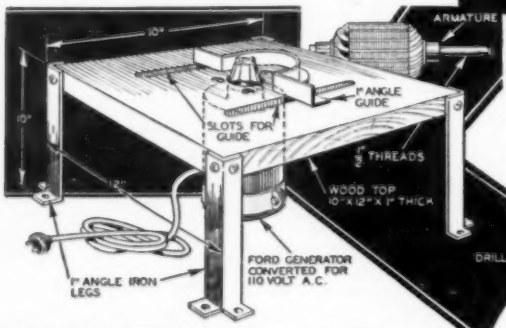
Connect one stationary and the movable brush together with a short lead, and remove the remaining brush. Adjust the movable brush and try different brush connections until the best speed is obtained. The unit should now run at about 1800 r.p.m. as a repulsion type induction motor. The frame will heat up considerably because of eddy currents, but this is unavoidable. —L. P. Hoffpauir, Jr.



HEAVY DUTY DRILL FROM AUTO STARTER—Many uses can be found for a portable electric drill heavy enough to drill ½" holes in metal, yet which can be operated where electric power is not available.

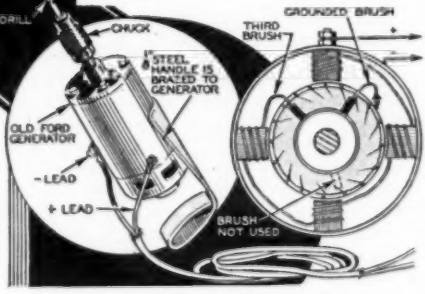
This drill is made of an old automobile starting motor and is operated by a six-volt auto battery. Remove the bendix drive and install a thrust bearing and drill chuck in its place. The bearing is necessary since considerable pressure on the drill is required when drilling heavy metal. The chuck mounting must, of course, be adapted to the starter being used. Mount the handles as shown.

If the motor runs in the wrong direction, reverse the connections to the field coils. Connect the drill to the battery with 6" leads made from high tension spark plug cable. Use heavy battery clips at the battery end.—Harold Jackson.



GENERATOR MAKES SHAPER—Fluting and mortising work of professional quality can be done on this Ford generator shaping machine. The entire unit fits on the workbench, and plugs into any 110 volt power outlet.

Make the shaper table first, using angle irons for the legs. Cut a 2" diameter hole in the center of the table and mount the generator with three screws through the table top. Cut two slots in the top to hold the adjustable guide. Rewire the generator as shown below or as in the May issue.—Sargent Palmer.



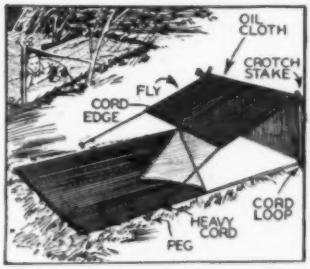
PORTABLE ELECTRIC DRILL—This generator conversion is ideal for light drilling work where speed rather than power is required. The chuck is mounted directly upon the armature shaft; it may be necessary to turn the shaft down a bit if the proper size chuck cannot be obtained. Braze or bolt any convenient type of handle to the generator frame.

While the rewiring diagram here is intended for 6 volt operation, it will operate even better on 110 volts alternating current.

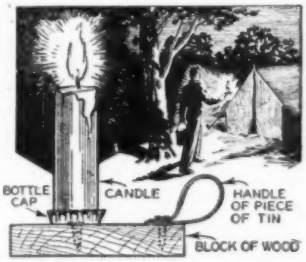
With one combination of brush connections the motor will run at the terrifically high speed of about 6000 r.p.m. on a.c., but this speed can be lessened by changing the position of the third brush.—L. S. Markovich.

SUMMER CAMPING KINKS

Hunter's Sleeping Bag Made From Oilcloth



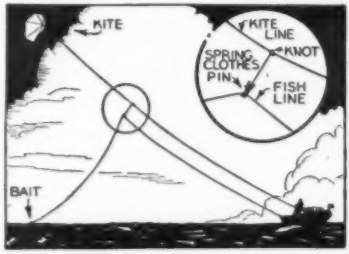
DUCK hunters and sportsmen who camp out overnight will find this water-proof shelter sleeping bag just the thing for rainy weather. Fold over one end of a 3'x16' strip of oilcloth to form a sleeping bag. Stitch the edges together with an awl and waxed linen thread. Leave one side open at the top for one foot, so the corner can be thrown down. Seven feet above the foot of the bag stitch two metal rings to the edges. Drive crotch stakes through the rings, and place a cross pole in the forks. Pull the fly over the pole and stake it down.—G. E. Van Horn.



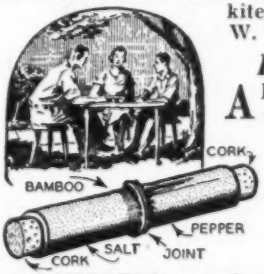
Novel Candle Holder

A HANDY candle holder for camp or home can be made in a few minutes from one of the crinkled beverage bottle caps and a few scrap parts. Nail the upturned bottle cap to a block of wood about three inches square. Bend a short piece of tin into a loop and nail to one side to form the handle. Press the bottom of the candle into the cap, and the holder is ready for use.—E. P. Barnhart.

Use Kite to Troll for Large Fish



THERE are many kinds of fish, especially in ocean waters, which are best caught with baits which just skim over the water. By supporting the trolling line from a kite towed behind the boat, this action of the bait can be had. The line is released from the kite when a fish is hooked.—W. J. Kraus.



Bamboo Salt Shaker

A HANDY combination salt and pepper shaker for out of door use can be made quickly from a section of bamboo fish pole. Saw off a nine inch section of about one inch diameter pole, locating the cuts to leave a knuckle joint in the center of the section. Shellac the bamboo inside and out, then place a cork in each end. Fill one end with pepper, the other with salt.—J. E. Bronson.

Powerful Wax Camp Lamp

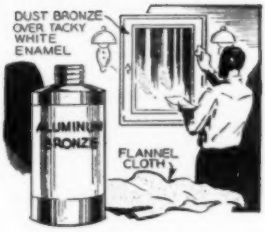
A POWERFUL camp lamp giving off a steady, brilliant illumination of about 60 candle power, or very nearly the equivalent of a 60 watt electric light, can be made at very little cost. Wind an ordinary ⅞" wide kerosene lamp wick diagonally around a length of stiff wire, place in the center of a cup, and fill the cup with melted parowax.—A. Schiltz.

Leather Fly Rod Case From Scrap Parts

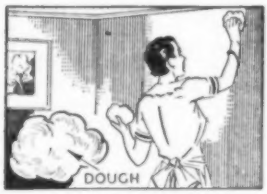
THIS fly rod case requires but a few cents expenditure and a little time. Close up one end of a 36" length of 2" tubular bed rail by gluing in a wood plug. Cut thin leather into 3" strips and wind around the pipe, first smearing glue on the metal pipe. Leather from an old auto cushion will be fine. Bind the bottom end of the tube with strong fishing line, the top end with silk thread. For a neat job bind the tube with colored silk thread at 6" intervals, using invisible knots. Apply a coat of varnish.—A. Debevec.

HOME REFINISHING SUGGESTIONS

Get Brilliant Metallic Finish on Wood Objects



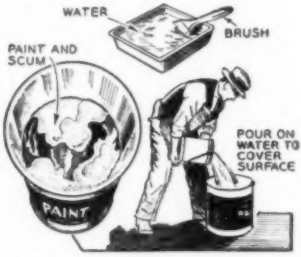
A BEAUTIFUL metallic silver finish can be had on any kind of material, wood, metal, or fiber. Give the surface to be treated several coats of high gloss white enamel or varnish. Let the first two coats dry, then sand lightly with fine sandpaper. It is extremely important to let the third or last coat stand until almost dry or just barely past the "tacky" stage. Now take a pad made of cotton flannel or velvet and dust and rub into the enamel a coating of Fine Lining Aluminum Bronze, a finer grade of ordinary aluminum bronze.—Bob Isaacs.



Clean Wallpaper With Stiff Flour Dough Wad

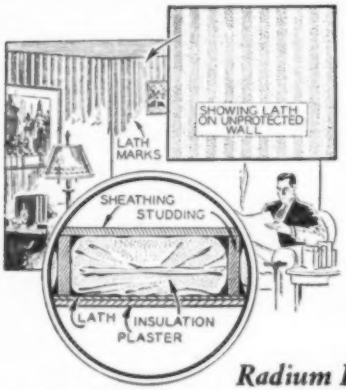
THIS inexpensive wall paper cleaner will remove dust and dirt from your rooms as if by magic. Add 2 teaspoons of ammonia and 2 teaspoons of baking soda to 2 cups of flour. Stir in enough water to make a medium stiff dough. Steam in a double boiler for one hour, knead the dough a few minutes, and it is ready for use.—John Pollock.

Prevent Scum in Paint



WHEN a can of oil paint is left standing for some time, and the cover is not air tight, a scum of thick pigment will form. This must, of course, be strained out before the paint can again be used. By pouring an inch or so of water on top of the paint just before it is put away the need for straining is eliminated. The water, being lighter than the paint, will stay on top and form an air tight seal. The water can easily be poured off when the paint is to be used again. Brushes can be kept soft by placing them in a pan of water.—S. Snyder.

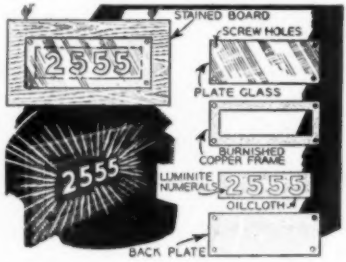
Insulation Prevents Lath Marks on Walls



UNSIGHTLY lath marks commonly seen on walls and ceilings have been found to be due to a difference in temperature of the laths and the plaster filling material. Dust has a tendency to deposit itself freely on a cold body, while a hot body repels dust. The dust therefore marks the spaces between the wood laths.

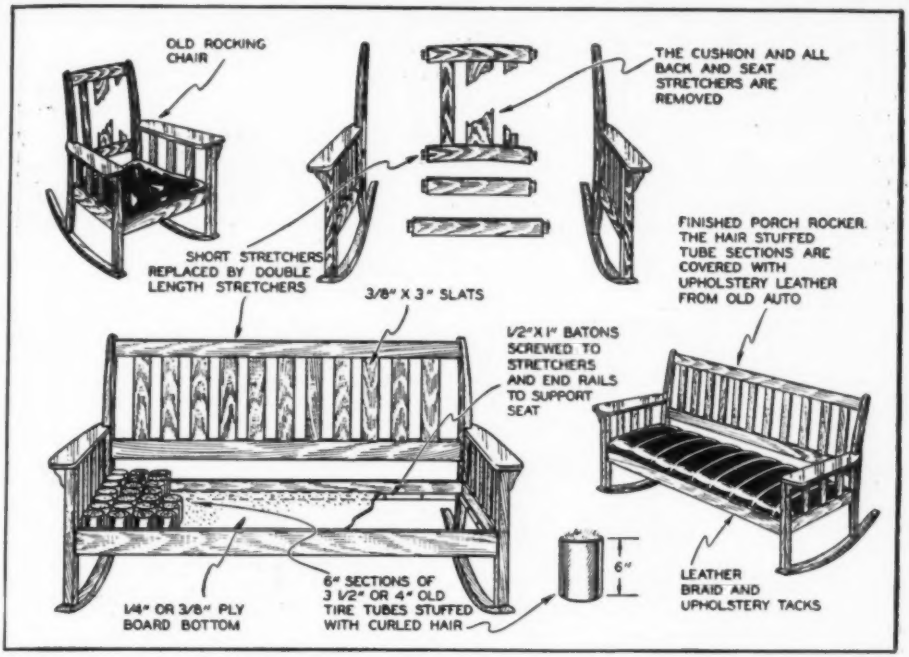
Wood fiber insulating material placed between the walls just next to the plaster prevents inside heat from passing out through the completely-plastered portions—the "thermal leaks." The initial cost of insulating material will be more than offset by the saving in fuel costs over a period of years, and by the more pleasing appearance of the plastered walls. This information should be of considerable value to anyone considering the building of a home with lath walls.—R. S. Jolson.

Radium House Numerals



EVERYONE has undergone the torment of looking for a house number on a dark night. This radium sign will make your number visible on the blackest night. Cut a sheet of heavy copper for the back plate, a sheet of oilcloth to go over it, slick side up, a piece of plate glass to go on top of the oilcloth, and last a burnished copper frame. Paint the house numerals on the oilcloth with luminescent paint. Mount the entire assembly on a wood backboard. The radium numerals will glow for years.—J. R. Dye.

Modernize That Discarded Oak Rocker


OLD ROCKING CHAIR
THE CUSHION AND ALL BACK AND SEAT STRETCHERS ARE REMOVED
SHORT STRETCHERS REPLACED BY DOUBLE LENGTH STRETCHERS
3/8" X 3" SLATS
FINISHED PORCH ROCKER. THE HAIR STUFFED TUBE SECTIONS ARE COVERED WITH UPHOLSTERY LEATHER FROM OLD AUTO
1/2"X1" BATONS SCREWED TO STRETCHERS AND END RAILS TO SUPPORT SEAT
6"
1/4" OR 3/8" PLY BOARD BOTTOM
6" SECTIONS OF 3 1/2" OR 4" OLD TIRE TUBES STUFFED WITH CURLED HAIR
LEATHER BRAID AND UPHOLSTERY TACKS

Steps in rejuvenation of semi-mission rocker shown at left. New stretchers and back slats are mortised and glued into place; novel curled hair and inner tube seat padding is used to make cushion which will hold shape and be comfortable.

THE attic or store-room of nearly every home will yield discarded articles of furniture which with a bit of modernizing can be made both useful and ornate.

The steps outlined here for remodeling an old oak rocker of semi-mission style can in general be applied to many other pieces of out-of-date furniture.

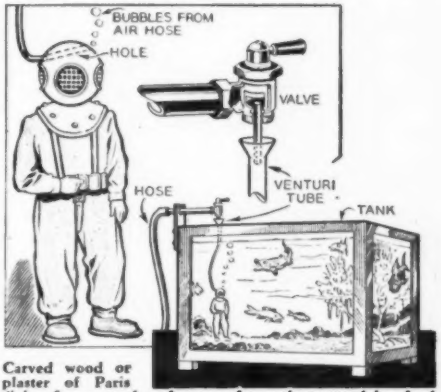
Separate all of the longitudinal joints, leaving the side assemblies intact. New stretchers twice as long as the originals are installed. The back is built up with hardwood slats in the conventional manner. A light plywood panel is set into the seat frame.

Rather novel but highly comfortable is the method used to pad the seat. Cut 6" sections of old auto inner tubes, ram them full of the curled hair used in auto cushions, and place on end in the plyboard seat panel. The curled hair can be bought for a few cents at an auto wrecking yard.

Cover the tubes with either leather or velour upholstery—for fifty cents or so you can get all you need at the auto wrecking yard. Tack the covering to the seat frame, apply varnish to the entire chair, and your rocker is modernized.

Lifelike Diver Aerates Aquarium

BUBBLES of air continually rising from a tiny diver model in the aquarium give a touch of realism to this aquarium aerator. Water under pressure passing into the funnel of the venturi tube draws air down into the aquarium with the fresh water supply.



Carved wood or plaster of Paris diving figure stands at bottom of aquarium, supplying fresh water and air for fish. Run hose to any water supply.

Popular Sports Pictured on Philippine Olympic Stamps

Set of three Philippine Islands stamps issued recently as Far Eastern Olympic games were held at Manila. Values are in centavos, one cent being equal to two centavos.

ATHLETES of the world are honored on the set of three commemorative stamps issued by the Philippine Islands just recently. The stamps picture some of the sports played at the Xth Far Eastern Olympic Championship Games in Manila.

"Batter Up" might well be the title of the 2 centavo stamp, given over to the internationally popular game of baseball.

The 6 centavo stamp shows a tennis player in action, and the highest value of the set, the 16 centavo, portrays the beginning of a basketball game. The set of three stamps is being sold for twelve cents by the Philippine Trade Commissioner.

Paper Aids Transfer Exchanges

THE "Trans-X-Change," a new transfer-collecting paper now being published, has been brought out recently to help newcomers in this hobby exchange their duplicate transfers with collectors all over the world. New transfer issues are also announced.

Through this paper collectors make contacts with fellow hobbyists all over the world to exchange transfers or trade them for stamps, tokens, or coins.

The collecting of street car transfers is one hobby which can be followed with a minimum of expense.

Austria Uses U. S. Election Cigars

Cigars with bands showing picture of Chancellor Dollfuss, Nazi foe, are used to offset Nazi propaganda in Austria.

AUSTRIA is now selling cigars with bands bearing the picture of Chancellor Dollfuss, foe of the Nazi.

Political cigars are not at all new, though. A generation ago politicians lavishly distributed cigars with bands having their picture and a "Vote for Me" slogan around election day.

Napoleonic Isle Gets New Stamps

Two of new St. Helena stamps. Portraits on 1½d are of William IV, Queen Victoria, Edward VII, King George V.

ST. HELENA, once the island exile of Napoleon Bonaparte, recently issued a beautifully engraved two-color set of ten stamps.

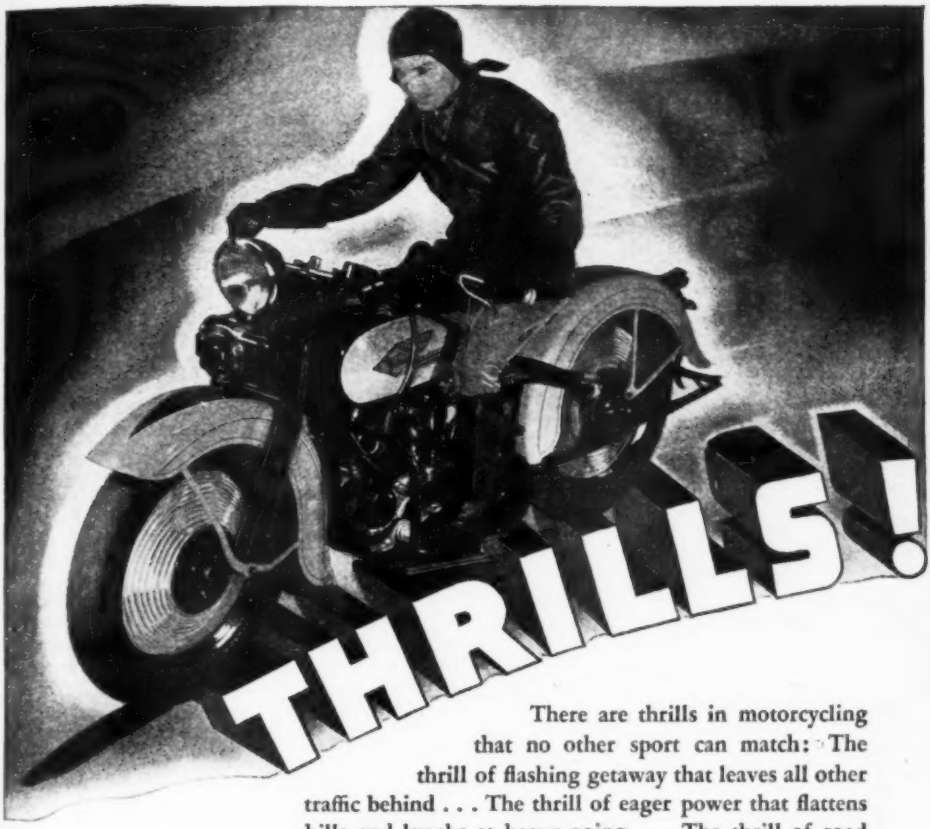
One of the most unusual of volcanic rock formations on the island, known as "Lot and Lot's Wife" is shown on the lowest value of the set. Other values show the four sovereigns who have ruled the island during the past 100 years, together with interesting plantation, harbor, and village views.

U. S. May Issue Santa Claus Stamp

POSTMASTER General Farley is said to be seriously considering the issuance of a stamp design in honor of Santa Claus. No details as to the date of issue, value, or design are as yet available.

Said by many to be the most beautiful

(Continued on page 116)



There are thrills in motorcycling that no other sport can match: The thrill of flashing getaway that leaves all other traffic behind . . . The thrill of eager power that flattens hills and laughs at heavy going . . . The thrill of road mastery as you breeze away, free as a bird, your mount under easy, effortless control, responding to your every whim.

Swing into the saddle of a Harley-Davidson — let these thrills race the blood through your veins — and you'll be a motorcycle enthusiast, eager for the tours, club runs, hillclimbs, race meets and other good times that await you as a Harley-Davidson owner.

See your dealer soon—look over the new models—ask about his Easy Pay Plans. And send in the coupon.

Down comes the cost of travel when you ride a speedy, thrifty Harley-Davidson. One cent per mile, including everything, is frequently reported — and 2c per mile is common. And think of the time you save!

Ride a

HARLEY-DAVIDSON

Mail this Coupon

HARLEY-DAVIDSON MOTOR CO.,
Dept. M.M., Milwaukee, Wis.

Interested in Motorcycling. Send Illustrated literature. Postage stamp is enclosed to cover cost of mailing.

Name.....

Address.....

My age is ( ) 16-19 years, ( ) 20-30 years, ( ) 31 years and up. ( ) under 16 years. Check your age group.

Open Skull Watch to Tell Time

Jaw of skull timepiece, made by Johan Maurer in 1600, drops to reveal watch inside.

PERHAPS the quaintest of ancient timepieces is the Johan Maurer skull watch, made in 1600. When the jaw of the skull is dropped, a watch is revealed. The valuable antique is in the famous collection of Jean M. Jellico. It is still in good running condition, for skilled watchmakers have gone over every part of the timepiece, replacing worn gears and making new springs.

The watch is about the size of a regulation baseball, the skull being a trifle more than two inches in diameter. A watch was so valuable in the 17th century that no one minded its bulkiness.

Acid Changes Colors of Stamps

A NUMBER of United States stamps can be made to take on entirely different colors merely by dipping in a very dilute solution of hydrochloric acid. The current 1-cent green will change to blue, the 3-cent purple to pink, and the 8-cent air mail stamp will become a deep rose in place of the regular olive green shade. A few of these color changes will add interest to any album page.

A series of ten stamps picturing the scenic beauties of our national parks will be issued during July. The stamps, ranging in value from 1 to 10 cents, will show scenes from Yosemite, Grand Canyon, Mt. Rainier, Mesa Verde, Yellowstone, Acadia, Great Smoky Mountains, Sequoia, Glacier, Crater Lake, and Zion parks.

U. S. May Issue Santa Claus Stamp

(Continued from page 114)

set of stamps issued in this country, the first in the series of 10 National Parks stamps, are now available at all postoffices.

Air mail rates for letters being reduced to 6 cents on July 1, a 6-cent air mail stamp has made its appearance.

A 3-cent stamp commemmorating the explorations of Jean Nicollet three hundred years ago in the territory now known as Wisconsin adds another to the already long list of commemorative stamps issued by the United States.

Late this fall a new Presidential issue, honoring those of our presidents who have not yet appeared on stamps, will appear.

ADLETS FOR HOBBYISTS

STAMPS

CAICOS ISLANDS—Also early United States, Uganda, Congo's, Nicaragua, Monte Carlo, Niger Coast, Canada, Newfoundland, and Ubangi—"Countries Collecters Haven't Got"—Free for 5c postage. Hurry for yours, Now. Empire Stamp Company, Dept. M.M., Toronto, Canada.

STAMPS! 100 diff. 2c; 500 diff. 35c; 1,000 diff. 90c. Tatham Stampco, D9, West Springfield, Massachusetts.

1863 LOMBARDY-VENETIA, Charkhari, Turks Caicos Islands, $5 U. S. Afghanistan, genuine Baden, and Imperforate Byrd—Absolutely free to approval applicants enclosing 3c postage! Viking Stamp Co., 1 Hanson Place, Brooklyn, N. Y.

ALBUM, 4100 spaces; 1000 hinges; 215 different foreign and U. S.; twenty airmails; 25 Japan; Tongs. All for 60c. Approvals. Burtis Company, Saratoga, N. Y.

STAMPS Sent on approval. 50% discount. Fred Herzberg, 197 Grantley Ave., Elmhurst, Illinois.

COLOSSAL Packet of Canada and other British Colonials, including commemoratives and pictorials only 10c to applicants for super-foreign approvals, economically priced. Swalley Stamp Service, 1119 Trenton, Los Angeles, Calif.

AIR Mails—From Brazil, Chile, Colombia, Ecuador and Mexico, all for only 10c with our double premium penny approvals. Progress Stamp Service, Franklin Park, Ill.

UNBEATABLE Collection—including Airmails, Tanganyika, Rhodesia, Soruth, Chakhari, Ecuador, Nigeria, Gold Coast and many other rare stamps—all for 10c—providing you desire bargain approvals. Lucas Stamp Service, Box 293M, Los Angeles, Calif.

134 VARIETIES United States; one block each 5 and 10c 1912 or 1914 for 42c in unused 3c stamps. Charles Townsend, Akron, Ohio.

WE HAVE answered all advertisements—compared all premiums, Approvals, etc., and absolutely proven that ours are far superior. Send 10c for our "Challenge" offer and you too will be convinced. Bargain Stamp Service, 1330 South Hope Street, Los Angeles, Calif.

STAMPS on approval. K. N. La Bar, 261 Jackson St., Huntington, Indiana.

GIGANTIC Collection, containing rare Triangle, Air Mail, Abyssinia, Algeria, Andorra, Barbados, Cameroons, Cape Verde, Dahomey, Kouang-Tcheou and other scarce stamps. Only 10c with approvals. Fred Walker, 627 S. Olive, Los Angeles, California.

MAMMOTH Mystery packet of rare stamps for only 10c to serious approval applicants, also valuable free premiums with every selection afterwards. Our stamps are better and our service is different. Fair-Play Stamp Service, 1215 Browning Blvd., Los Angeles, California.

COINS

SAVE 8 Coins now circulating. Rare—worth fortune in future. Government statistics prove. Send dime—refunded. Michael Smith, 811 Merchant Ambridge, Pa.

$5000.00 each for certain coins! New complete rare coin catalog only 25c. Box 108D Glens Falls, N. Y.

HIGHEST Prices paid for Indian Head Cents. Send dime for list of those wanted. Coin Shoppe, Box 407-MM, Ottawa, Ill.

WE BUY 1907 Indian head cents. Full information one dime (coin). New Miss Mattick Co., Box 3455, Altoona, Pennsylvania.

OLD MONEY Wanted. $5.00 to $2,500.00 each paid for old coins. Buying catalog 10c. Robert Cohen, Box 483, Muskogee, Okla.

COINS, California gold quarter size 27c; $½ size, 53c. 3c piece and coin catalogue, 10c. 200 different stamps and stamp catalogue, 10c. Norman Shultz, Salt Lake City, Utah.

$5 to $500 EACH paid for Old Coins. Keep all old money. Get posted at once. Send 10 cents for Illustrated Coin Value Book 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

FREE—Foreign coin, banknote, and large illustrated coin catalogue—4c postage, Souvenir California gold quarter size 26c; $½ size 53c; both 65c! Round or octagon, set of each $1.30! Approvals with each order. Tatham Coinco, West Springfield—9, Mass.

BUY NO INSURANCE
until you learn about
POSTAL LIFE'S $1.00 A MONTH POLICY

DUE to conditions many people have been forced to give up their insurance, and many others feel that they can't afford any. To meet this situation Postal Life Insurance Company has designed this special Dollar-A-Month policy.

It is a unique policy in that it costs only $1.00 a month, no matter what your age may be, from 18 to 50 years. The amount of insurance that this dollar a month will buy, however, varies with the age. For example, at age 18 it will buy $1275 worth; at age 25, $1085; at age 30, $948; at age 35, $813. To find out what it will buy at your age see table below.

DESIGNED FOR THOSE WHO HAVE LET THEIR INSURANCE LAPSE OR WHO FEEL THEY CAN'T AFFORD ANY

The rate of $1.00 a month—less than 25c a week—is just one-half the permanent premium rate. In other words, because most men who have wives and families to support want to give them the utmost protection, at a rate they can afford during the next five years while conditions are improving, the premium for the first five years has been modified to one-half the permanent premium. From the 6th year on this policy costs you only the low rate permanent premium of $2 a month. This premium may be still further reduced by the dividends Postal pays you as earned and declared by the Company.

This exceptional policy, therefore, has a two-fold advantage. First, it costs you less during the next five years of transition to better times; and Second, at the beginning of the sixth year you start paying the $2.00 premiums—but based on the lower rates of your *present* age, not what it will be five years from today. Thus from the beginning you receive Old Line LEGAL RESERVE Insurance with cash values and standard policy provisions at a price you can afford.

You Deal Direct

Only Postal can give you a life insurance value like this, for Postal sells direct by mail and has no agents—you save on agents' commissions. You buy this policy *direct* from Postal at its home office in New York.

Note What $1 a Month Buys

Age.	Amt.	Age	Amt.
18	$1275	35	$813
19	1248	36	786
20	1221	36	759
21	1194	37	734
22	1167	38	708
23	1140	39	682
24	1112	40	657
25	1085	41	632
26	1057	42	607
27	1030	43	583
28	1003	44	559
29	976	45	535
30	948	46	512
31	921	47	489
32	894	48	467
33	866	49	445
34	840	50	

FOR JUNIORS (10yrs.to20yrs.)

We also issue a $1 policy for Juniors. For free information write Dept. 654.

A Safe, Sound Company

For the past 29 years Postal Life Insurance Company has been providing insurance direct-by-mail to thousands upon thousands of thrifty, sensible people in every State in the Union, and has paid out more than $40,000,000 to its policy holders and their beneficiaries.

Postal Life does business under the strict supervision of the New York State Insurance Department and is subject to the United States Postal Authorities everywhere.

Mail Coupon Now—We Have No Agents

It's easy to buy this Dollar Policy by mail from Postal. The table below shows how much insurance a dollar will buy at your age. If you feel you can afford to spend $2.00 a month, you can buy twice as much, or $3.00 will buy three times as much, etc. Then fill in the coupon below and send it with your first month's premium to the Postal Life Insurance Company. That's all you do. You get your money back if your application is not accepted. You take no risk.

Don't turn over this page until you have clipped the coupon below—it may be the most important thing you have ever done. Tomorrow may be too late.

TEAR OFF—MAIL TODAY

POSTAL LIFE INSURANCE CO.,
Arthur Jordan, President.
Dept. 654, 511 Fifth Avenue, New York, N. Y.

I wish to apply for a life insurance policy in accordance with your offer.

My exact date and year of birth was .....

My occupation is .....

Nationality .....

I wish to pay a premium of ☐ $1. ☐ $2. ☐ $3. ☐ $.... per month. This entitles me to ..... worth of insurance. I enclose the first month's premium which will be returned to me if my application is not accepted.

Name .....

Street & No. .....

City ..... State .....

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WOOD IN CANS

Makes 101 Automobile Repairs Quickly, Easily, Permanently

Now, anyone can repair rotted or punctured auto tops, broken steering wheels, windshield leaks, loose door hinges, dented fenders or bodies, body squeaks and rattles, loose interior fixtures—with this marvel of science—called Plastic Wood.

It's simple to use—can be shaped with the hands as easily as putty but when it dries it becomes HARD, PERMANENT WOOD that holds nails and screws securely, can be sanded, planed or carved, can be painted, varnished, lacquered. With genuine Plastic Wood you can be sure your repairs are permanent—it is stronger than real wood. Sold at paint, hardware, auto accessory, department stores in 25c tubes, 35c cans.

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NRA

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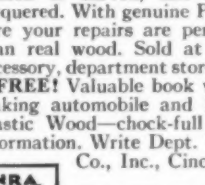

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American School, Dept. H628, Drexel at 58th, Chicago

Making Realistic Movie Earthquakes

(Continued from page 81)

open to the street.

Most of this exterior collapse effect is produced by steel cables operated from winches, or by piano wire, which may be used in the scene itself without being noticed on the screen, and is strong enough to pull out "triggers" set to hold up artificially weakened portions of heavy structures. In many cases trucks are used to pull the cables or wires. One of the most spectacular effects is obtained by encircling a building close to the ground with a steel cable, one end fastened to a solid pier or other immovable support, the other attached to powerful trucks or tractors. This literally shears off the building and causes the structure to collapse.

Ingenious effects such as pavement cracks in which fleeing persons are trapped by a foot or hand as they open and close are arranged by controlling the cracked paving or earth on rollers from pits underneath. The solid parts of this structure are prevented from closing and crushing the human victim by blocks, and the lips of the cracks are made of soft rubber or other material which gives the appearance of crushing around the imprisoned limb.

Sets Rock on Rollers

Fracture lines and the nature of all structural collapses are definitely governed by prearranged weaknesses, such as "weak-knees"—a trade name for supports that are hinged and give away when pulled.

Interiors are rocked by means of springs and rollers under floor joists, a method similar to that used in reproducing the rocking of boat and train interiors. For earthquakes, however, much more irregular and jerky motions are supplied, partly by a different handling of the levers which move the set, operated by hand, and partly by an eccentric arrangement of the rollers and springs. The sudden, characteristic settling movement of earthquakes on interiors is often achieved by rolling the set off a balanced support, allowing it to drop several inches or a foot.

Masonry Loaded With Dust

All artificial masonry is loaded with dust which takes the place of the pulverized cement and stone dust a real collapse would have caused. Live electric wires are dropped across each other for spectacular fire effects, and hidden electric fuses set fire to broken gas pipes. Smoke rockets are used liberally and gushing water mains are handled from off-scene by wires which break seals.

Literally hundreds of studio technical workers, each with his particular duty to perform, operate the more extensive of these earthquake scenes, obeying telephonic instructions or switchboard signals from the director. In the larger scenes thousands of dollars are poured into a destructive effect that lasts but a few moments, but meanwhile cameras, shooting from every angle, have recorded it for every possible use in the film. And in these big scenes, nothing goes wrong or fails to "break away."

New INVENTION SAVES GAS!

7 MILES MORE PER GALLON on PLYMOUTH

MOTORIST SAVES $180.00 a YEAR

Saves up to Thirty Per Cent On Gas. Provides Faster Pick-Up—More Power—Greater Mileage and Smoother Running.

GET FREE INFORMATION

F. S. Peck Insurance Agency
212 CAPITAL BANK BUILDING

General Agents

Telephone Main 107

March 15, 1934.

Vacu-matic Carburetor Co.
7617 W. State St.
Wauwatosa, Wisconsin.

Gentlemen:

I thought it might be interesting for you to know that I had an automatic gas consumption tester attached to my Plymouth Six and obtained an average of 15 miles to the gallon. I then installed your Vacu-matic to satisfy myself as to its merits and under the same conditions and the same course of travel I obtained an average of 22 miles per gallon, which you see is an increase of 7 miles per gallon. At our present price of gasoline and traveling approximately 1500 miles a month, this means a saving to me of $15.00 a month or $180.00 a year.

I am writing this letter unsolicited on account of the satisfaction I have had since this installation.

You may use this letter as you see fit.

Yours very truly,

F. S. PECK INSURANCE AGENCY,

By

FSP/H

* The above letter from California is unsolicited, and is just one of the many letters received from enthusiastic users.

VACU-MATIC

PATENT PENDING

the Carburetor Control that "Breathes"

AT LAST! Automotive engineers have smashed down the barriers to perfected combustion! The new VACU-MATIC solves the secret of greater power! With almost magical action, this amazing invention instantly puts new life and pep in any motor. It adds mileage to every gallon of gasoline . . . produces split-second pick-up, sensitive accelerator response, greater speed and smoother running . . . unfolding a new driving thrill for you!

Entirely New — Nothing Like It!

The self-starter—four wheel brakes—knee action—streamlining . . . and now VACU-MATIC! The greatest motor improvement of recent years! With it, engineers have achieved a practical means of AUTOMATICALLY balancing air and gasoline in correct proportions for ALL speeds! Functioning directly with the manifold vacuum, VACU-MATIC actually "breathes" when needed, giving your motor correct combustion. Sharply cuts fuel wastes, saves dollars in gas costs, reduces carbon and gives your engine new pep, greater power and longer life.

Agents and Salesmen

If you are interested in earning up to $15 daily, check coupon. Exclusive territories now being granted.

Fits All Cars

VACU-MATIC is constructed of six parts, electrically welded into one unit, correctly adjusted and sealed at the factory. Nothing to regulate. Any motorist can attach VACU-MATIC in ten minutes. Once in, its only reminder is the surge of instant power and speed it gives to the motor and the savings it affords your pocketbook.

The VACU-MATIC Co., Wauwatosa, Wis.

Guaranteed Gas Savings

The VACU-MATIC proves itself on every car. It is guaranteed to give worth-while gas savings, quicker pick-up, and more power or it costs you nothing. "On a test I gained an average of 4 miles on a gallon," writes Alex Wertz. "Vacu-matic is the best I have ever tried." Clarence Rutzin—"I have tried the Vacu-matic on several tests and find that I get between 5 and 6 miles per gallon increase, have more mileage, have greater pickup."

Free Details

Learn about this remarkable device that so greatly affects the entire performance of your motor. Learn why your car is costing you extra money to operate without VACU-MATIC. See why your VACU-MATIC equipped car will leap away from traffic without sputter or hesitation. Discover a new driving thrill and enjoy the savings that more than offsets VACU-MATIC's slight cost. Get the facts! Write today!

FREE OFFER COUPON

THE VACU-MATIC COMPANY
7617-34 W. State St., Wauwatosa, Wis.

Gentlemen: Please send me full particulars concerning the Vacu-matic and details of your Free Offer. This of course does not obligate me in any way.

Name.....

Address.....

City..... State.....

☐ Check here if interested in selling proposition.

BECOME A RADIO EXPERT

GOOD JOBS
Learn
Radio-Television
Electricity & Talking Pictures in Los Angeles

A GOOD JOB AWAITS YOU IF YOU TRAIN IMMEDIATELY

National will quickly train you to qualify for good jobs in all branches of radio, television, talking pictures, broadcasting, operating and general electricity. Thorough practical training. Over $100,000 in modern equipment. Complete broadcasting and television studios where you get actual practice in all branches of these interesting remunerative trades.

QUALIFY AS A

Radio Repair Man
Television Expert
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Station Technician
Sound Expert
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and many other jobs

COMPLETE COURSES

We offer six complete courses at low tuition fee originally asked for only one course. You are trained in fundamental principles of electricity and radio work, you operate actual equipment under personal direction of experienced instructors and learn by actual shop experience. Upon graduation you can qualify for scores of good jobs anywhere.

ASK FOR DETAILS

Send coupon for descriptive literature. You owe it to yourself to become thoroughly acquainted with this great school. You will find the facilities here a positive revelation. Get new book, which gives you all the facts in story and pictures—SEND COUPON AT ONCE!

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For a limited time we will allow your reach railroad fare from any part of the United States to Los Angeles. We cannot guarantee to continue this remarkable offer indefinitely.

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This is the ideal city. Center of greatest activity in radio, talking pictures and electricity. Approximately one billion dollars being invested in California in electrical development, including gigantic Hoover Dam, L. A. Power Aqueduct and Central California power program. This means new jobs for years to come.

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Send Book and full details of Courses.

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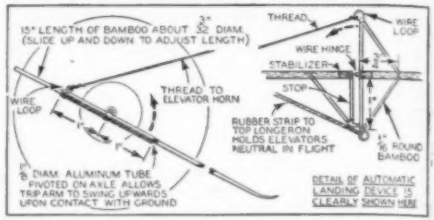
Build This Scale Model Monocoupe

(Continued from page 106)


15" LENGTH OF BAMBOO ABOUT 32 DIAM. (SLIDE UP AND DOWN TO ADJUST LENGTH)
3" 32 DIAM.
THREAD
WIRE LOOP
WIRE HINGE
STABILIZER
STOP
THREAD TO ELEVATOR HORN
WIRE LOOP
RUBBER STRIP TO TOP LONGERON HOLDS ELEVATORS NEUTRAL IN FLIGHT
1" 8 DIAM. ALUMINUM TUBE PIVOTED ON AXLE ALLOWS TRIP ARM TO SWING UPWARDS UPON CONTACT WITH GROUND
DETAIL OF AUTOMATIC LANDING DEVICE IS CLEARLY SHOWN HERE

This landing device brings the model to a three point landing. When the skid touches the ground, the thread to the elevator horn sets the elevator for landing model.

Next construct the motor stick which is built up of ⅛"x⅛" balsa strip. The propeller is carved from a 1"x2"x16" block of medium hard balsa. A cowl is turned from soft balsa.

The dummy motor consists of seven equally spaced cylinders made from ⅝" round balsa.

Now construct the main wing which is built in three sections; that is, the center section and the two main panels. First build up the two front spars which are identical. These are built up of 1/16"x3/16" strips and are constructed as a continual truss. They are 28⅜" long and 1⅛" wide. The rear spars are built similar to the front ones but are of 1/16"x5/32" strips and are 27⅛" long and ⅝" wide. The center section spars are but 6" long. The trailing edge is cut from ⅛"x7/16" soft balsa, the wing tips are of 3/32"x3/16" balsa, and the leading edge is cut from ¼" thick sheet balsa and is cut to the shape of the nose of the rib. It is then hollowed out so that the walls are but 1/16".

Now build the ribs. Nine are built of 1/16"x1/16" strip balsa and twelve are of 1/16"x⅛" strips. A jig will be necessary for their construction. The jig is made from a piece of heavy cardboard about 1/16" thick. From this a piece (the shape of the wing section less the leading and trailing edges) is cut and then the remaining cardboard is tacked on a flat board of suitable size (about 3"x12"). Now draw, with pencil, on the board, all of the rib members. Be sure to leave two spaces for the spars. Now place all of the pieces and the cap strips in place and secure with pins. Glue all of the joints and allow to dry. You may build all but the two end ribs and two end half ribs in this jig. Another jig must be made for them.

In constructing your wing panels merely slip the correct number of ribs and half ribs on the two spars and lay these down on a full size drawing of the wing. The ribs are 3" apart with a half rib between every two ribs. Every other rib is of 1/16"x1/16" strip with the 1/16"x⅛" ribs between.

Glue all the joints and attach your leading and trailing edges and wing tip. Allow to dry and then build your other panel and center section. Then secure the three together with webs of 1/32" sheet balsa at the points of connection. Cover the wing with paper, dope it, and set it aside.

Learn to Mount Birds and Animals—Send Coupon for Free Book!

HELLO, SON. SPENDING THE EVENING AT YOUR WORK-BENCH AS USUAL?
COME IN, DAD. I WAS JUST READING THIS AD OF THE NORTHWESTERN SCHOOL OF TAXIDERMY.
IT SAYS THAT MOUNTING BIRDS AND ANIMALS IS A GREAT HOBBY FOR THE MAN WITH A WORK-BENCH—AND PROFITABLE, TOO. WHAT DO YOU THINK?
1
WELL, SON, I DO KNOW THAT THAT SCHOOL WAS TEACHING TAXIDERMY WHEN I WAS YOUR AGE—THIRTY YEARS AGO. I OFTEN WANTED TO LEARN IT MYSELF.
IF IT'S AS INTERESTING AS IT SOUNDS, I'M AT LEAST GOING TO INVESTIGATE. AND I COULD SURE USE SOME EXTRA MONEY RIGHT NOW—ALICE WANTS A NEW DRESS AND I'D LIKE A NEW SET OF TOOLS
2
LATER
NOT SO BAD FOR A BEGINNER. THERE'S A LAMP THAT WILL LOOK DANDY IN MY DEN. GUESS I'LL ASK DAD TO DROP OVER TONIGHT AND TAKE A LOOK.
3
WHY BOB, YOU CERTAINLY DID TAKE UP TAXIDERMY IN EARNEST, DIDN'T YOU?
I SURE DID. I'VE MADE AND SOLD A BUNCH OF BOOK-ENDS, MIRRORS AND SO ON TO HUNTERS FOR THEIR DENS. AND FUN? SAY DAD, TAXIDERMY'S THE GRANDEST HOBBY IN THE WORLD!
4
THAT SQUIRREL BOXING GROUP IS ONE I MADE FOR GREEN'S SPORTING GOODS STORE FOR A WINDOW DISPLAY. SO FAR THIS MONTH I'VE BOUGHT THOSE THINGS I WANTED, AND MADE MY WORK-BENCH PAY ME AN EXTRA $68—JUST FROM TAXIDERMY.
5
AND I NOT ONLY MOUNT TROPHIES FOR OTHER SPORTSMEN, BUT MOUNT MY BEST ONES FOR THE DEN HERE. WHY DAD, I NOW GET TWICE AS MUCH FUN FROM MY HUNTING AS I USED TO. YOU WOULD TOO IF YOU LEARNED TAXIDERMY.
IT SOUNDS GREAT, SON. WHEN DO I START?
ALFRED MILLER
6

Fun—Fascination—Profits

Be a Taxidermist. All Secrets Revealed. Learn at Home

Save Your Hunting Trophies

Mount (stuff) expertly your valuable **game-birds, animals, fish, game-heads.** Preserve them just like **life.** That is Taxidermy. Learn at home by **mail.** Decorate home and den with nature's art. Make undreamed-of **profits** in spare time, in your shop. You can. Will you? Win fame as a taxidermist. Investigate. Mail **coupon** NOW.

Success Guaranteed

This old reliable school has graduated 200,000 students in Taxidermy. 30 years in business. Our great success permits this **guarantee.** We **know** we can teach **you.** It's a grand money-making **hobby.** You **must** be interested, if you hunt or fish or have a work-shop. **Ask** for the **free book** and learn all about Taxidermy.

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Or a postcard will do. No obligation on your part. The beautiful **Book,** with hundreds of entrancing **Pictures** is **Free.** Don't miss your **Only Chance** to get this remarkable book **Free and Postpaid.** Write today. State your **Age.**

Northwestern School of Taxidermy
4736 Courtney Bldg. Omaha, Neb.

Wild Game Not Needed

Use **common** specimens; squirrels, rabbits, chicks, pets, owls, pigeons—even frogs. Make useful articles like those shown here. Mount them in human and humorous positions. This is craft and novelty taxidermy. It's **fun**—and **profitable.** All included in our unique lessons. It's **marvelous.** Write the school this minute.

BIG PROFITS From Your Shop in Spare Time

Many students earn from $40 to $75 monthly in spare time. Some earn thousands of dollars each year. Sportsmen bring their trophies to be mounted. Besides you can sell your own **Novelty** groups for homes, dens and for merchants' window display.

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The lessons teach tanning harness, sole, crome leather; also furs. Expert methods. **Very profitable.**

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Name..... Age.....

Address.....

I'm Going to Get THAT JOB!

I want to become a
Diesel Engineer
because every day makes it more evident that the economical and efficient Diesel engine is **rapidly replacing old-type engines** in locomotives—ships—airplanes—motor cars—tractors—industrial and commercial power plants.

American School
Dept. D628, Drexel Ave. at 58th St., Chicago, Ill.

Tell me how to become a Diesel Engineer. No obligation.

Name_____ Age____

Address_____

Industry Demands *Economical Diesel Power*

Diesel-driven railroad trains that average nearly 80 miles per hour and cost **less than 2c per mile for fuel**—trucks that make over 33 miles per hour on **fuel costing 4c per gallon**—stationary power plants that greatly **reduce the cost of industrial power**—explain why the low-cost, highly efficient Diesel engine is fast replacing the old-type engines. And that's why the Diesel engineering field is opening so rapidly—on land and water and in the air—that **trained men are already scarce.**

Why take up a **routine job** with no real future? Or stick in an out-of-date job which **may be wiped out** any day by changing conditions? Like the automobile and radio, the **Diesel engine is revolutionizing industry**—throwing old jobs into the discard, opening up new and better jobs to men with a mechanical turn. Here is **your** chance to get into a new industry that will provide **plenty of good jobs** for at least a generation. **Get in on the ground floor**—and grow up with it to an **enviable, well-paid position.**

New Jobs — Bigger Opportunities

New Diesel Engineering Course—**just released for home study** by one of America's leading educational institutions—will give you, in one year, thorough training in Diesel practice for both high-speed and stationary engines. **All texts furnished**—small monthly payments.

Trained men are wanted to install, operate, and service Diesel engines—sell users on the economy of Diesel power—design and manufacture Diesel equipment. And **this demand will grow constantly greater** as Diesel power takes over more and more of the work now done by steam and gasoline. Start your training NOW—and in a short time you will be ready for a well-paid job and steady advancement in this attractive, fast-growing line. **Take the first step today**—send coupon for information. No obligation.

American School
Dept. D628, Drexel Ave. at 58th St., Chicago

Hunter of the Stone Age Mammoth

(Continued from page 73)

The turning-point came in 1921 when he veered his eyes toward the Gobi Desert, a rugged hinterland challenging only rugged men. Dr. Andrews, tall, sturdy, daring, met the challenge. He yearned to wrest from the Gobi the secrets of Man's beginning.

Dr. Andrews' first startling message came to the outside world on November 25, 1925, from his headquarters somewhere in the Gobi, Mongolia. "Human culture in Asia antedated European civilization by 10,000 years and it is indicated that prehistoric man originated in Asia," it said.

One expedition followed another to this treasure chest holding the secret of world life. The oldest mammal skulls in the world were found in the Gobi. They were transitional mammals that were just being evolved from the reptile stage 10,000,000 years ago.

One of the main objects of Dr. Andrews' expeditions is to find the "missing link" in the evolution of man. "The stages of evolution," he said, "can be traced without a break from primitive forms of unicellular water life successively down through fishes, reptiles, birds to mammals and down through the various species of mammals until there should be a common ancestor for man.

"We are working on the theory that the cradle of the human race was in the uplands of Central Asia. We believe that in this region we will find traces of the prehistoric man, and that the Garden of Eden was in the Gobi Desert."

(Continued on page 145)

Cutting Tennis Expenses in Half

(Continued from page 102)

and replaced in the spring. (Simple directions for restringing rackets were given in the May issue of MODERN MECHANIX AND INVENTIONS.)

Remember, a racket should always be kept in a press when not in use or tight stringing and atmospheric conditions will cause it to warp.

In the course of a season's play, most rackets develop cracks, which, if unchecked, enlarge and ruin an otherwise good frame. The correct repair procedure is shown in Figs. 4, 5 and 6.

Old fishing line — preferably unwaterproofed casting line—is excellent for this purpose since it has enough stretch to lend itself to tight winding. Lay the end of the cord parallel to the edges of the racket and begin winding as in Fig. 4.

The end is secured as illustrated in Fig. 5. Do not pull the last five or six turns tight, but slip the end of the string back under them and then pull tight with a pair of pliers. Trim the ends.

Soaking the whole reinforcement with shellac will cause it to shrink and tighten. After it dries, give the completed winding another coat of shellac to effect a smooth and hard-wearing surface. Now the crack will not increase.

WORLD'S GREATEST TIRE BARGAINS

NEW LOW PRICES ON

GOODYEAR, Firestone, FISK
U.S., Goodrich, *and others...*

29x4.40-21 **$1.55**

● NEVER BEFORE SUCH QUALITY AT SUCH AMAZINGLY LOW PRICES

30 X 4.50-21 **$1.75**

FREE

TIRE GAUGE OR BRAND NEW TUBE WITH EACH TWO TIRES ORDERED

BALLOON TIRES

Size	Rim	Tires	Tubes	Size	Rim	Tires	Tubes
29x4.40-21		$1.55	$0.85	31x5.25-21		$2.45	$1.15
29x4.50-20		1.65	.85	28x5.50-18		2.45	1.15
30x4.50-21		1.75	.85	29x5.50-19		2.45	1.15
28x4.75-19		1.75	.95	30x6.00-18		2.65	1.15
29x4.75-20		1.85	.95	31x6.00-19		2.65	1.15
29x5.00-19		2.05	1.05	32x6.00-20		2.65	1.25
30x5.00-20		2.10	1.05	33x6.00-21		2.85	1.25
28x5.25-18		2.10	1.15	32x6.50-20		2.85	1.35
29x5.25-19		2.15	1.15	34x7.00-20		3.15	1.65
30x5.25-20		2.15	1.15	35x7.00-21		3.15	1.65

REGULAR CORD TIRES

Size	Tires	Tubes	Size	Tires	Tubes
30x3	$1.85	$0.65	32x4½	$2.55	$1.15
30x3½	1.85	.75	33x4½	2.55	1.15
31x4	2.35	.85	34x4½	2.55	1.15
32x4	2.35	.85	30x5	2.65	1.35
33x4	2.35	.85	33x5	2.85	1.45
34x4	2.55	.85	35x5	2.85	1.55

HEAVY DUTY TRUCK TIRES

Size	Tires	Tubes
30x5	$2.85	$1.95
32x6 (8 ply)	4.95	2.75
32x6 (10 ply)	5.95	2.75
36x6	6.15	3.95
34x7	7.45	3.95
36x8	8.45	4.25
40x8	9.75	4.95

TRUCK BALLOON TIRES

Size	Tires	Tubes
600x20	$2.65	$1.65
700x20	3.75	2.95
750x20	4.25	3.75

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Drive YORK TIRES at high speed over the roughest roads. These tires can really "take it." Thousands of hard drivers vouch for their unusual stamina. Users say, **"York Tires stand more punishment and give more service than other reconstructed tires."** Try a set yourself. See how the original York process of reconstruction gives to tires the stubborn kind of toughness you know you can depend upon. **18 years of success back of every tire we sell.** Then . . . you have the additional protection of the iron clad York Guaranty Bond . . . a 12 month written guarantee of 100% satisfactory service . . . you to be the sole judge. No "ifs" or "ands". No arguments. Don't wait. While York prices are lowest in history, get your order in and enjoy these supreme values. Select either of the two big premiums offered elsewhere on this page. Send at once while this offer lasts.

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NRA

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ORDER NOW AND SAVE MONEY

Send only **$1.00** deposit with each tire ordered. (**$3.00** deposit on each Truck Tire.) We ship balance C.O.D. Deduct **5 per cent** if cash is sent in full with order. **ALL TUBES BRAND NEW—GUARANTEED.** Tires failing to give 12 months' service replaced at half price.

GLOBE TIRE AND RUBBER CO.

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Dept. 4409, Chicago, Illinoi

"MY PAY ENVELOPE

ALWAYS DEPRESSED ME"

"It was so thin. And had so little money in it! I was almost 40 years old and had not had a raise in 5 years. What's more, I didn't see any prospect of a raise. It was a terrible feeling.

"I had been reading advertisements of the International Correspondence Schools for years but never paid much attention to them. One of them happened to strike my eye rather forcibly, and I realized there was a coupon at the bottom of it. Well, on the impulse of the moment, I mailed that coupon. *It was the most important thing I have done in years.* There is a long story in between — and several raises! And another one coming this week, with the promotion that **I. C. S.** training gave me.

"Any man that's not getting anywhere on his job should read an I. C. S. advertisement and act!"

INTERNATIONAL CORRESPONDENCE SCHOOLS

"The Universal University" **Box 2321-Y, Scranton, Penna.**

Without cost or obligation, please send me a copy of your booklet, **"Who Wins and Why,"** and full particulars about the subject before which I have marked X:

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If you reside in Canada, send this coupon to the International Correspondence Schools Canadian, Limited, Montreal, Canada

Six-Tube Auto Radio Brings in DX

(Continued from page 90)

take up very little space and are bolted to the chassis top.

Next, install the three coils, being careful to mount the antenna coil in the corner. The coils are mounted directly underneath the space that will be occupied by the three gang tuning condenser. The only other item that is mounted underneath the chassis is the push-pull transformer. It is suggested that this transformer be left out until all wiring of sockets is completed so that there will be no difficulty in wiring in the sockets.

The tube shields and condensers are left off the top of the chassis until all wiring has been completed. It is much easier to wire up the set in this manner, as the chassis may be laid on the workbench bottom up and soldering in of resistors and condensers done with ease.

For ease in construction it is suggested that the fixed condensers as well as resistors be of the "pig tail" type, eliminating unnecessary wiring.

Connect Antenna to Potentiometer

The antenna lead is connected to one side of the potentiometer arm or directly to the top of the antenna coil primary. No terminal is used here—just a soldered lead.

The two sockets on the side of the receiver chassis serve as terminals for the necessary speaker and power supply connections. Of course these schemes can be ignored and cables run directly from set to power source. The plug and socket method of making connections permits the chassis to be removed from the case at any time, without disconnecting any wires.

Now that all under wiring is completed the final work on the top of the receiver may be tackled. As the rotors of all three condenser sections are grounded to the chassis connections are only made to the fixed plates.

Adjusting Trimmer Condensers

The three condenser gang is accurately matched at the factory, but the slightest bump or jar may destroy this balance. If a gang condenser having trimmer condensers mounted integral is used, as shown in the sketches and photographs, the tuning condensers can be rematched after the set is assembled. Adjust each with a screwdriver after the set is working until reception is loudest and clearest.

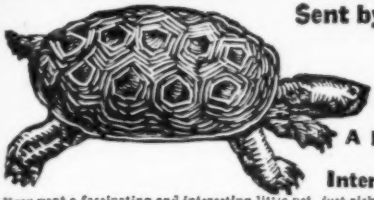
Short leads are run from the trimmer condensers to their respective tube grids. Remember that in wiring in screen grid tubes the grid lead goes to the cap on top of the tube, and the screen grid lead to the grid prong of the socket.

It is very important that the radio frequency and detector tubes be shielded from each other. To do this a very simple shield arrangement is used. Strips of metal slightly higher than the tubes are riveted or bolted together to house each tube in what might be called its own "stall."

The power required for this receiver is but 135 volts. If the usual 45 volt B cells are used

(Continued on page 150)

REAL LIVE PET TURTLES



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Washing Skyscraper Windows

(Continued from page 37)

rest. The other day I ran into him and he told me that he missed the work and had gone back to polishing panes. I guess the heights get in your blood after a while and you can't stand what some folks call terra firma.

"The men folks who squawk when they have to clean a dozen windows in their homes will get some idea what a job we have when I say we have to keep 6,500 windows looking spick and span. We have to work fast, too, because there's a lot of prejudice among office folks when the window cleaner barges in. Yet there's a lot of fuss made if the windows don't get prompt attention. So we're always in the middle no matter how you look at it.

Window Cleaners' Reward

"The eight men are divided in teams of two. Each team is responsible for 25 floors. Those who finish first have the reward of doing the upper stories which run up to the 102d floor. Then if they have done a good job I always let them have a little time on the Observation Tower, taking in some of the sights they don't dare peek at while they're minding their business.

"The mainstay of the window cleaner is his life belt. This is made of leather and goes around his midsection. It is very thick and each end hitches to a steel hook which protrudes from the side of the window where he is working. If one end of the belt should lose its grip, he would still be held by the other end. The steel brace in the back of the belt is so constructed that the leather cannot slip through it.

"We never work on rainy days. As a matter of fact, we take it easy in all kinds of stormy weather. The risk would be too great when a blizzard is raging. It's bad enough on the streets in the skyscraper zone to say nothing of bucking the arctic gales 100 stories high and trying to put a shine on a window.

"Our jobs are most dangerous in the winter time, of course. The sills of the Empire State Building windows have a one and one-half inch margin. Look at your shoe and try to mark off one and one-half inches and then you realize what a window cleaner's foothold must be 60 or 80 stories high.

Braving Wintry Hazards

"To give you some idea of the hazards of this business, let me picture the window cleaner's problem on a cold winter morning. He goes to the 80th floor for work. The window is probably jammed because of the ice and cold. The sill on which he is to place his feet is sheathed in ice. He's got to get out on that perch. No wasting of time to chip off or melt the ice. He's got to make speed.

"His mind must be off danger. The mental hazard would lick him from the start if he gave in to it. He must remember that the first thing to do on opening the window—after he has securely adjusted the life belt to his body—is, to hook up one end of the belt to the window. Then he can step out

(Continued on page 148)

MAURI ROSE, 2nd, says: "Again I used Pyroil and finished in 2nd place in 500-mile race averaging 104.698 miles per hour. I can't say too much for Pyroil." (signed) Mauri Rose.

LOU MOORE, 3rd, says: "In finishing 3rd in Indianapolis 500-mile race, can deservingly praise Pyroil for its great work in my transmission and rear axle." (signed) Lou Moore.

DEACON LITZ, 4th, says: "Pyroil was my insurance against oil difficulties this year . . . . I finished 4th with no oil trouble." (signed) Deacon Litz.

JOE RUSSO, 5th, says: "Finished 5th in 500-mile race using Pyroil. I always depend on Pyroil in racing and in my personal cars." (signed) Joe Russo.

BARNEY OLDFIELD said, "Just as Pyroil was used in breaking four records in qualifying for the 500-mile race, I predict that the winners will again use Pyroil as they did last year." (signed) Barney Oldfield.

And, they did! Thirty-three cars started in the race. Twelve, only, finished. And, of these twelve, **eleven** used Pyroil.

Thus, Pyroil demonstrates again, its matchless efficiency. For, in last year's Indianapolis race, Pyroil won 1st, 2nd and 5th.

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Fish in Deep Water During August

(Continued from page 93)

this float, preferably cork, being kept something like two or three feet under the water surface.

The old method of obtaining water for camp is a good one to use to detect the temperature of the water in any fishing location. Attach a weight to the bottom of a jug and tie a rope or stout cord to the handle. Attach another cord to the cork, and set the cork lightly in the hole so that a jerk will readily take it out. Sink the jug to the bottom and when it is down, jerk the cork out, the jug will fill and it can be brought to the surface. Test the water for temperature. If it ranges between forty and fifty degrees, you have found good fishing water.

For taking the bass in deep water in August, the live frog is a good bait.

The freshwater crab or crawfish is also a good deep water lure. Driving the hook into the crab soon kills it. A better method which helps to keep the crab alive on the hook is to solder two fine wires on the back of the hook. Now lay the crab on the hook stem and twist the wires around it in such a manner that it cannot break loose from the loops.

Deep Trolling Rig for Lake Trout

The deepest run of all the game fish in our fresh waters, wherever such occur, is the lake trout species. They are taken in the month of August at depths of 150 to 200 or more feet. About the only practical way of trolling for lake trout, if a silk line is used, is by means of the branch line rig.

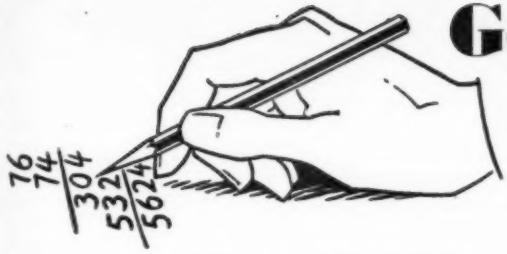
A three-way swivel, obtainable in most sporting goods stores, forms the nucleus for attaching to each of the three eyes the main line, the line to the lure, and, lastly, the line section to the dipsey sinker as shown.

In Canada considerable deep trolling for lake trout is managed by the use of extremely fine braided brass wires, the weight of the line being sufficient to sink it without the need of lead sinkers. There is no doubt but that such lines fulfill their purpose; and it can also be said to be true that solid copper wire answers a purpose equally as well. In certain sections of Ontario, 18-gauge solid copper wire is used, the reels being large enough to accommodate 300 feet of this wire.

When Still Fishing the Depths

It is not generally known by fishermen that the deeper you fish the more vibration is put into your line when still fishing. Vibration makes the fish suspicious. To overcome this vibration sink the bobber by applying sinkers to the line so that it will be an inch or so under the water surface.

Instead of using one heavy sinker, use many smaller ones of the split-shot type, arranging them starting about eight inches above the hook. The best arrangement, shown in the drawing, is to use four sinkers spaced two and two with a space between, then another space and six split shot in a row.



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Driving Pleasure Car or Death Trap?

(Continued from page 59)

Although the brake equipment on any new modern car will stop it in a fraction of the legal stopping distance, tests of millions of cars on the highways of the United States show that *one in three of the autos being operated needs some adjustment of the brakes and that one in nine is so bad that it cannot stop within the required limit.*

Stopping Distances Prescribed by Law

In how short a distance can you stop your car? Most states have prescribed by law a certain legal limit for your shortest stopping distance. In California, you must be able to stop your car within thirty-seven feet from a speed of twenty miles per hour on clean, dry, level, concrete pavement. This is an unusually lenient figure. Most modern cars equipped with four wheel brakes, even if they are not power brakes, will stop within twenty feet under the same conditions; and if the brakes are unusually good, it is possible to stop within a distance of nine or ten feet.

But do not use these figures as a basis from which to estimate when to apply the brake! Many other factors influence the distance you require to stop. "Reaction time"—the time you take to estimate the situation, to command your foot to press the brake pedal, and finally to do it, may lengthen your stop considerably.

This reaction time varies with different individuals and with the same individual at different times. It is often as long as one-half second. During this time, at fifty miles an hour, you will travel about thirty-seven feet before your brakes begin to slow you down.

Brakes Versus Roadway Surfaces

The surface of the roadway influences the shortest stopping distance a great deal. Tests have shown the following variations in stopping distances when brakes are adjusted to stop the car in about twenty-five feet from twenty miles per hour on smooth, dry concrete:

On muddy concrete or asphalt . . . 48 feet
Rough ice or packed snow with chains . . . . . 48 feet
Rough ice or packed snow without chains . . . . . 80 feet
Smooth ice without chains . . . . 148 feet

Remember that your stopping distance increases as the square of the speed of your car! That is, with the same brakes, if you need only twenty-five feet to stop from twenty miles per hour, at twice that speed you will need four times the distance, or one hundred feet, to stop. Thus if you are foolish enough to go forty or fifty miles per hour on a smooth, ice-covered pavement, you may travel six hundred feet or more—as far as a whole city block—before you stop, if you do not skid into something and crash first!

Most automobile drivers keep their cars safe by repairing their brakes as soon as they become worn. But this should be done immediately. Brake testing officers have recorded many accidents which occurred after the driver had been warned that his brakes were weak. Such a case occurred recently

(Continued on page 145)

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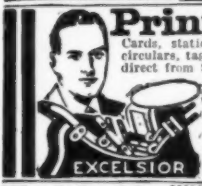

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The Amazing Story of Boulder Dam

(Continued from page 54)

Marching in their wake is a row of giant towers. Each is more than a hundred feet high, with 65-foot cross arms. Each weighs 9 tons and is surmounted by a network of hollow cable which will carry the stupendous load of 275,000 volts of man-made electricity.

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It is estimated that five years will be required to fill the basin after the last concrete is poured. When the reservoir is finally filled, as expected, in 1940, the water impounded by the dam will create an enormous lake which would cover Manhattan Island to a depth of half a mile.

The greatest depths of the lake will be about 1000 feet. Boats will ply its surface and national highways will doubtless encircle it. It will stand as a stupendous monument to man's industry—a Mecca for tourists and the industrial salvation of the Southwest.

Undersea Pipe Line Loads Tanker

(Continued from page 41)

of the launch, and connected to a portable telephone. The telephone system consists partly of an armored cable running from the control house on shore and paralleling the loading line undersea. Thus by this method telephone connection is made with the superintendent of the Estero pipe line, in charge of operations at the loading terminal and the captain of the tanker. When all is ready to receive the oil, the message, "You can start the oil now," is telephoned from aboard the tanker to the man in charge of the valves in the control house, who then opens the wheel on the control stand and the loading of the oil aboard the tanker begins. Then for many hours the oil streams into the compartments of the tanker.

After many hours of loading, a climax is reached as the order, "Slow down to half speed," is telephoned to the shore station. The oil stream is cut down as the loading nears completion. Shortly after comes the phone order: "Stop loading. Cargo finished!"

The lines to the buoy are disconnected, a launch returns the telephone line to its buoy and the tanker hoists anchor for a foreign port.

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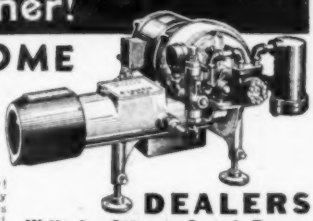

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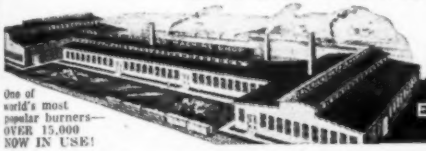

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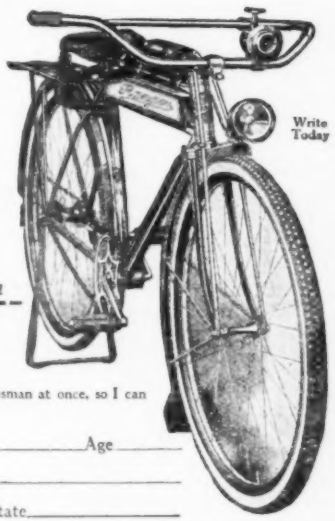

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Viewing Insects Thru a Microscope

(Continued from page 65)

and moths (meadow), as many different kinds of beetles as possible; flies, fleas, lice, bees and ants.

Upon returning to your workroom, place those parts wanted for mounting, such as legs, antennae, and wings, into separate and labeled vials of 95% alcohol and allow them to remain for several hours or over night.

Now transfer the parts to a solution of carbol-xylol for the same length of time, to complete the process of extracting all water from the material. The solution is prepared by mixing one part of melted carbolic acid crystals with two parts by volume of xylol, a wood oil also known as xylene. Avoid inhaling the fumes of this acid or splashing it on your hands. Carbolic acid has a terrific affinity for water, and takes up the remainder of the water in the insect parts.

The objects are next rendered more transparent by leaving them in a solution of xylol for one to two hours.

Making Objects Transparent

The finished specimen is to be buried in balsam between the blank slide proper and an exceedingly thin cover glass. Balsam, a resin, is solid at ordinary temperatures, and transparent, thus being an ideal mounting medium.

Dissolve the balsam in xylol for application to the slide. The xylol evaporates as the finished slide is drying, leaving a thin, solid layer of transparent balsam.

It is very important that there be no traces of water on the slides or the specimen. The slightest amount will turn either the balsam or the xylol to a milky color.

Completing Slide Mounts

Thoroughly clean a slide and cover glass by dipping them in alcohol and wiping carefully with a soft, old cloth, free from lint. Old linen is best, cheesecloth next. It is well to pass both slide and cover through the flame of an alcohol lamp or gas burner before using. Place the specimen, removed from xylol and with the excess fluid drained off by touching to an absorbent cloth or paper for a moment, in the center of the slide. Add two drops of balsam solution and apply the cover glass. Hold clean glassware by the edges only, as even clean fingers leave prints of oil or moisture. Grasping the cover by its edges, lower it over the object slantingly. Allow one edge to touch the slide, then let go and the cover will settle into place, the balsam spreading out evenly beneath. Place the slide away in a flat position in a warm place free from dust while drying. Allow from several days to two or more weeks, depending upon the thickness of the mount.

Making slides is a lot of fun, but after all the microscope and the slide are only a means to an end. They constitute a method of observing otherwise invisible structures and hence of adding to our knowledge. Much may be gained from a study of a collection of insect legs, or antennae, or wings.

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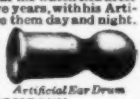

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Planes for World's Greatest Air Race

(Continued from page 45)

dad, Calcutta, Darwin, Charleville, and Melbourne. Many of the fields are small. Darwin is a small airport of only 600 by 440 yards. Singapore has only a 1,000 yard field, while Charleville has an airport 700 by 600 yards.

Both U. S. and foreign fliers are having their ships built in U. S. factories. Consequently the number of American planes in the race will far outnumber other makes. American motors show still greater popularity. Many are being installed in foreign built ships.

Several women pilots will vie with famous men fliers for honors in the race. The noted Amy Mollison of England will take part, probably acting as co-pilot with her equally famous husband. Mrs. Louise Thaden is also entered, with her husband as co-pilot. Laura Ingalls, who recently completed a 17,000 mile solo flight around South America, is another famous woman entry. Although her entry has been accepted, the noted Ruth Nichols may not be able to compete due to conflicting flying engagements.

In all, 64 ships are entered in the race. Many of these, of course, will drop out before the starting date. Great Britain had sixteen pilots in the original entry list; France, seven; Holland, five; Australia, four; Italy, New Zealand and Sweden, two each; and Denmark, Germany, India, the Irish Free State and Portugal, one each.

America Demands New Inventions

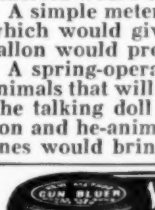
(Continued from page 75)

We need pocket flashlights with cheap renewable batteries—batteries that can be easily recharged by simply introducing a little cheap chemical material. The problem here is not that of designing a small wet cell but to construct the cell so that the liquid will not run out when the light is carried in the pocket.

An electric bottle warmer for babies is needed that will automatically cut off the current when the bottle has reached the proper temperature. A simple thermo-static control is needed, and if this could be provided, a hundred thousand mothers in America would buy these articles every year.

A simple meter for the dashboard of a car which would give the number of miles per gallon would prove popular with motorists.

A spring-operated noise producer for toy animals that will make them roar and squeal. The talking doll for girls was worth a million and he-animals for boys along the same lines would bring a tremendous fortune.



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Hunter of the Stone Age Mammoth

(Continued from page 122)

The Baluchiherium mammoth, dug up in 1928, weighed 20 tons. As far as known, it is the largest mammal that ever trod the earth. It was 25 feet high and an equal length and lived 6,000,000 years ago. He also found parts of a dinosaur that evidently was 100 feet long.

In December, 1929, another important scientific message came from Dr. Andrews in Asia. The "Peking Man" was found. He was buried 1,000,000 years before he was turned up by the explorer. The "Peking Man" is the nearest approach to the "missing link," the oldest human skeleton ever found.

In 1930 his expedition discovered miles and miles of Pliocene strata. This contains the bones of primitive man, he says. The Peking Man was found in this shelf. This level in the Gobi structure was formed just before the Ice Age and holds the keys that will solve great problems, the famous explorer asserts.

Is the secret of man's origin in the unfathomed depths of the Gobi? What's to be found on this Pliocene Avenue? How about the Garden of Eden? Will Roy Chapman Andrews eventually find this Paradise? Will any man ever find it? Roy Chapman Andrews says "Yes." Maybe he'll be the man. He's young yet—and been exploring only 20 years.

Driving Pleasure Car or Death Trap?

(Continued from page 134)

when a test showed that a light truck's brakes required more than fifty feet to stop from a speed of twenty miles per hour. The officers cited the driver to have his brakes repaired and retested and he drove away. Within a mile, his soft brakes allowed him to roll onto a railroad track in the path of an oncoming train which hit the truck and killed the driver.

It is not necessary to wait for traffic officers to test your brakes in order to know their condition. If you have to use your emergency brake frequently—if you roll a few feet across the line when the signal turns red—if you often hit the other fellow's bumper when parking—your brakes are not quite good enough.

"The first thing a locomotive engineer does when he gets into the cab is to test his air," an engineer says. "Is your life any more valuable than his? Then test your brakes every time you start out from your garage. You do not need to do this at a high speed. If you can slide all your tires from any speed at all, your brakes are all right."

You can avail yourself of various means of keeping informed of the condition of your brakes. But in the final analysis, regardless of electric or air brakes, regardless of official brake tests, or of unofficial "safety lane" tests, the use of your brakes in an emergency is up to you. Only the driver can decide when to apply his brakes in order to avoid an accident.

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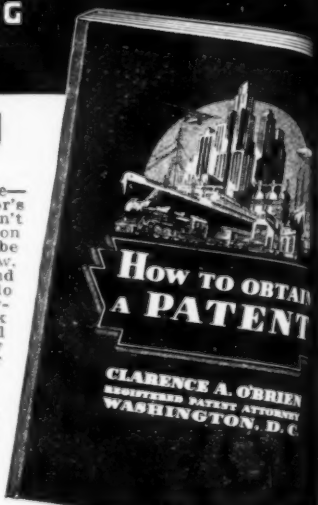

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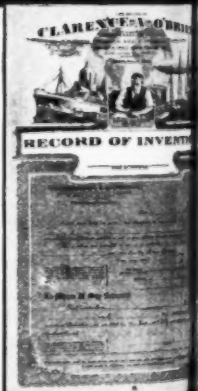

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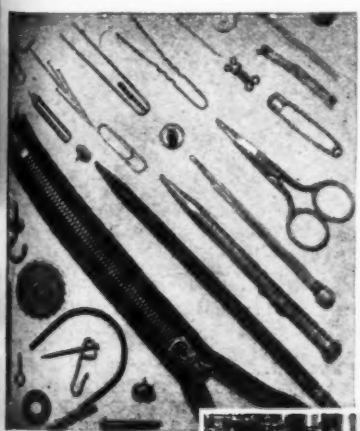

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How do *you* know *you can't* WRITE?

Have you ever tried?

Have you ever attempted even the least bit of training, under competent guidance?

Or have you been sitting back, as it is so easy to do, waiting for the day to come some time when you will awaken, all of a sudden, to the discovery, "I *am* a writer"?

If the latter course is the one of your choosing, you probably *never will write*. Lawyers must be law clerks. Doctors must be internes. Engineers must be draftsmen. We all know that, in our times, the egg does come before the chicken.

It is seldom that any one becomes a writer until he (or she) has been writing for some time. That is why so many authors and writers spring up out of the newspaper business. The day-to-day necessity of writing—of gathering material about which to write—develops their talent, their background and their confidence as nothing else could.

That is why the Newspaper Institute of America bases its writing instruction on journalism—continuous writing—the training that has produced so many successful authors.

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NEWSPAPER Institute training is based on the New York Copy-Desk Method. It starts and keeps you writing in your own home, on your own time. Week by week you receive actual assignments, just as if you were right at work on a great metropolitan daily. Your writing is *individually* corrected and constructively criticized. A group of men, whose combined newspaper experience totals more than 200 years, are responsible for this instruction. Under such sympathetic guidance, you will find that (instead of vainly trying to copy some one else's writing tricks) you are rapidly developing your own distinctive, self-flavored style—undergoing an experience that has a thrill to it and which at the same time develops in you the power to make your feelings articulate.

Many people who *should* be writing become awe-struck by fabulous stories about millionaire authors and, therefore, give little thought to the $25, $50 and $100 or more that can often be earned for material that takes little time to write—stories, articles on business, fads, travels, sports, recipes, etc. —things that can easily be turned out in leisure hours, and often on the impulse of the moment.

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SS1394

Why don't you write?

Washing Skyscraper Windows

(Continued from page 128)

and quickly attach his belt to the other hook.

"He must not unhook the second snap on his belt until he has placed his foot safely within the interior after finishing the job.

"The closest shave I ever had was while cleaning windows in a skyscraper here. The idea was to have the windows cleaned during the fifteen minutes between class periods.

"I had finished one set of windows and was in a hurry to get to the next classroom. Instead of unhooking my belt and going all the way around, I decided on a short cut. I unhooked the belt and proceeded along a wall ledge, about eight feet long and six inches wide, carrying a pail and a ladder.

Death Hangs in the Balance

"Just as I got to the middle, I began to wobble. My toe-hold was failing. I had allowed one foot to get out a little too far, just enough to upset my balance. I stood still, or tried to. I teetered a little but I kept calm. I was facing the building wall, trying to hug it with my body. I glanced down over my shoulder and saw a cop standing below. There was nothing he could do. I was ten stories up, and on the verge of falling.

"In the end I managed to regain my balance and my hold. I wormed my way over to the next window and went right on with my job as if nothing had happened. That's the worst jam I was ever in. That might have been the one fall allotted me—and fatal!

"There is a standing army of 3,000 window cleaners in New York City, and it's my guess that we have the biggest mortality rate of any working class in the world. Most insurance companies won't have anything to do with us. We're marked 'V. P. R.'—very poor risk.

"The average window cleaner gets $30 weekly for 48 hours under the NRA. Aside from the perils, it's nice, clean, healthy outdoor work, and we have very little labor trouble. You see, this is one trade in which there are no strikebreakers.

"When a man applies to me for a job, I don't listen to any hot air about how good he is. I hand him the equipment, take him to the 100th floor, show him what a swell sight it is, to see all the other big skyscrapers sprawled out below, and then I say, 'Okay, my man, go to it. Tackle that window right there.'

"I've never seen it fail. If they're not full-fledged window cleaners they quit right on the spot. It takes a lot of nerve to step out into space, 100 stories up, if you're not made for it.

"I'm forty years old and like my job very much. We're all a happy-go-lucky bunch and sleep a good ten hours every night. We eat lightly. You've got to. On Sundays we have a feast, however. I've got a son, 15, and he's going to be an engineer. He says he doesn't care much for the wide open spaces where his old man works. Well, maybe I can't blame him after all for not wanting to lead a sparrow's life."

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. . . writes George Bailey

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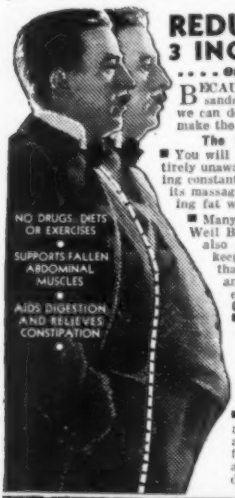
What a change! I looked 3 inches slimmer at once and soon I had actually taken EIGHT INCHES off my waist . . . and 90 pounds off my weight!
It seemed to support the abdominal walls and keep the digestive organs in place . . . and best of all, I became acceptable for insurance!
I have a new feeling of energy and pep . . . work better, eat better, play better . . . I didn't realize how much I was missing!



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■ The Weil Reducing Belt will make you appear many inches slimmer at once, and in 10 short days your waistline will actually be 3 inches smaller . . . 3 inches of fat gone . . . or it won't cost you one cent!

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Fat Is Dangerous

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Name .....

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Use Coupon or Send Name and Address on Penny Post Card

Six-Tube Auto Radio Brings in DX

(Continued from page 124)

the 67½ volt screen grid supply is taken off from the 22½ volt clip on the second B battery in the circuit. A total of three 45 volt B batteries connected in series gives the required 135 volts.

If an auto B power unit is used a center-tapped voltage divider will provide the correct screen grid voltage. Use shielded cable for all battery leads. The speaker used is an automotive type dynamic requiring only six volts on the field coil. Connect the speaker leads to the speaker plug as shown in the pictorial diagram.

Chassis Slides Into Cans

After the receiver is completed a can for containing it must be constructed or purchased. The size of this container is 9"x7⅝"-x6¼". The front of the can opens to allow removal of the set. Two small angle strips are bolted to the container just high enough to allow the chassis to slide in.

The can must be mounted in a convenient location inside the car. The universal place for this is just under the dash. Two holes in the back of the can are drilled for this purpose. It is only necessary to drill two holes in the wood or steel bulkhead, and bolt the can in place. In this location it is very simple to get the necessary current. The chassis being automatically grounded it is only necessary to connect on to the "hot" side of the auto's ammeter to get the current for the tube filaments, dynamic speaker field and auto B Power Unit if one is used.

The last item to be dealt with is the tuning control. Here there is a choice of one of two methods. The usual scheme is a remote control device mounted on the steering post of the auto. The remote control equipment is expensive, however, and will in no way improve the operation of the set. A simpler method, now being adopted on many new makes of auto radios, will be followed.

Tuning Dial Mounts on Set

Direct tuning with a regular dial mounted on the side of the can is used. Tuning will be easier if the set is clamped to the side of the steering post instead of under the dash. A combination volume control and switch is mounted next to the tuning dial.

The antenna may be a length of copper fly screen mounted under the roof of the car IF it is free from screen of the "chicken wire" type used by some auto manufacturers for supporting the roof covering of the car. Cars having "chicken wire" in the roof must use a running board antenna or one fastened between the front and rear axles. The most effective type is a sheet of brass, copper or aluminum mounted under one of the running boards of the car. This sheet must be raised above the bottom of the board by means of wooden blocks at each end. This is to prevent the antenna from being grounded. The antenna lead-in should be carefully shielded with braided metal loom grounded wherever possible. The lead is brought into the set through a hole in the bottom of the can.

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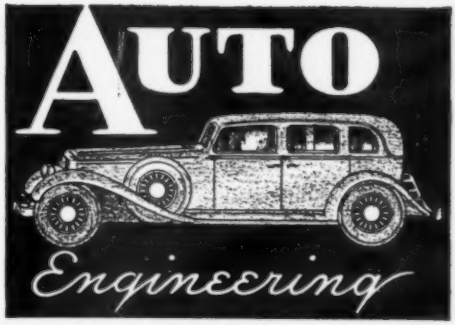

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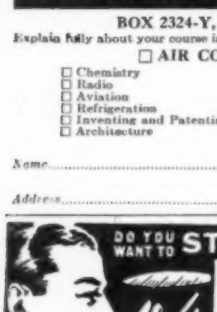

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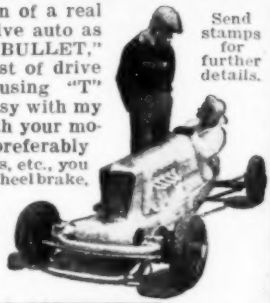

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Uncle Sam's W-A-R Rules Network

(Continued from page 49)

ators taking messages manually from the nine Corps Area headquarters or from Hawaii, Panama, or Army transports at sea. These operators take from 35 to 50 words a minute—a higher rate than any commercial system is prepared to handle manually in a routine manner. There is no fussing with dials to tune in. This is all done at the new receiving station at Battery Cove, just south of Alexandria.

Handling High Speed Messages

When incoming messages become too heavy to handle manually, the high-speed apparatus is used. Coming in at 200 to 400 words a minute, these messages are recorded on dictaphone records. The operators then slow down these records to a speed at which they can be handled and transcribed on a typewriter.

Outgoing traffic at Washington is usually so heavy that the high-speed system is used. An operator types out the message on a tape-punching machine, which is similar to a typewriter except that the key cuts a pattern of holes on a paper tape instead of printing letters through a ribbon. This tape is fed into the sending machine.

The operators do not have to worry about wave lengths or frequencies. Tapping a few letters on a buzzer, which sounds through a loud speaker at the transmitting station at Fort Meyer, just across the Potomac, will hook the sender up with one of the fifteen transmitters at that station.

Washington ordinarily communicates directly only with the nine Corps Area headquarters at Boston, New York, Baltimore, Chicago, Atlanta, Columbus, San Antonio, Omaha, San Francisco, and the Department headquarters at Panama and Hawaii. Messages for other stations are then relayed to posts in those areas.

The Signal Corps' Army of Amateurs

The Message Center at Washington also cooperates with over 1200 civilian "ham" operators, who receive no pay, furnish their own equipment, and volunteer their services. Perhaps the most important peace-time function of the amateur net is its tie-up with the Red Cross. If a disaster should destroy wire and land communications, the Red Cross representative in any town could call upon a "ham" in his district to put him in touch with the outside world.

One of the main functions of the Army net is the training of personnel. It takes about 18 months to make a good operator, and with a three-year term of enlistment the turnover is rapid, for Army-trained radio men are in demand by commercial firms. The pay of a student is now $19.95 a month, while a trained operator averages about $50. Radio men aboard merchant ships get $90 a month, while shore stations pay from $140 to $200. The training of these men is a good investment on the Army's part, however, as in case of war it would have first call over the men it had trained.

"GARLIC...
one of nature's most valuable foods can now be obtained
ODORLESS, TASTELESS
in its new form of mint coated
PURE GARLIC TABLETS

SCIENCE has long known the rich medicinal value of garlic . . . centuries ago, Pharaohs, the ancient Greeks and Romans . . . and Napoleon fed their men GARLIC to keep them in good health and give them strength.

■ Until the introduction of the Genuine, Pure GARLIC Tablets (Specially processed to eliminate the after odor and to prevent any obnoxious exhalations) . . . the embarrassing GARLIC odor and taste had made it impossible for many people to be benefited by the extraordinary virtues of Garlic.

Contains VITAMINS A B and C

■ The pure, odorless and tasteless GARLIC Tablets possess sufficient vitamins A B and C, potassium, calcium, phosphorus, traces of iodine, derivatives of sulphur all of which are beneficial in many cases of:

HIGH BLOOD PRESSURE . . . as a means of lowering; improves symptoms such as Dizziness, Headaches, disturbances of Climacteric (change of life).

NERVE DEPLETION . . . and exhaustion (remarkably better sleep noticeable) vitalizes Heart, Liver and Kidneys, helps to keep the all important glands in youthful condition.

ASTHMA, GOUT, RHEUMATISM . . . aids in destroying stones, neutralizes poisons in the human system, improves general condition favorably.

INTESTINAL TROUBLES . . . relieves flatulance, gas on the stomach, diarrhea, soothes pain, colic, being a stomachic, appetizer, vermifuge (worm-expeller).

HUNDREDS of TESTIMONIALS on FILE!

"I have suffered for years with some ailment to my left kidney and my nerves, and now after taking not quite all of the box I am getting relief and feel like a different person" . . . Mr. W. G.
"My husband has been a sufferer from Asthma for 19 years and after taking one week's treatment of your garlic pills has found relief, has not had an attack since" . . . Mrs. S.
"My brother was advised by his physician that he had HIGH BLOOD PRESSURE. After taking your Genuine Garlic Tablets, the pressure had been reduced from 230 to 176" . . . Mr. B.

2 Tablets Every Morning and Evening Bring Perfect Results!

■ An atmosphere of unmeasurable gratefulness and confidence radiates from hundreds of appreciative letters (reorders) given by people of whom many were on the verge of despair before taking our pure Genuine GARLIC Tablets. They are guaranteed; packed in air-tight tins with lock-top, containing 130 tablets (4 weeks' supply).

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If you prefer, we will send C.O.D. plus 12c postal fee.

Name .....
Address .....
City..... State.....

■ Applicants for agencies please give references. ■

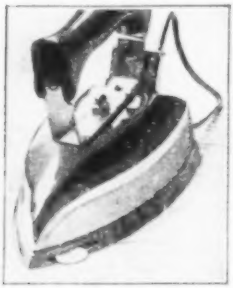
Double Toothbrush Among Late Inventions

New shape brush cleans outer surfaces with up and down motion. T-shaped end of this double toothbrush cleans outer surfaces of teeth in easy, natural way with up and down motion. Regular brush end removes food particles from inner crevices of teeth. Brush is now on market.

Christmas tree light bulbs which will operate directly on 110 volts have recently been developed. Slightly larger, and using only a little more electricity, the new lamp has a burning life of 500 hours. When one of these lamps burns out, it will not cut out others in the same string. The bulb sells for approximately the same price as the series-burning type.

Two color graph paper for draftsmen has small squares in blue, which do not show when drawing is reproduced. Paper is ideal where material is being prepared for publication.

Paper disc oil filter reclaims used auto crankcase oil at a cost of about four cents a gallon.



You can get around and even under buttons with this new electric iron. There are slits in each side near the point.

A new kitchen tool removes the strings and slices string beans in one quick and simple operation. The device is instantly adjustable to different size pods.

Washable wallpaper minus the customary appearance of oilcloth is now being made by a recently patented process. Even grease spots can be removed.

An electrical safe for small stores cannot be opened for 15 minutes after the combination has been set. Few bandits will take the risk of waiting 15 minutes, even if they can force the storekeeper to give them the combination.

Simple new gauge determines amount of dirt in auto crankcase oil. Need for oil change can be accurately determined, eliminating guesswork.

Model A Ford marine conversion parts are now available at small cost. It is claimed converted motor will stand up to any marine motor of its size, horsepower, and weight, driving anything from a fast runabout to a large 36 foot mud scow. As marine engine, rating of Ford conversion is 40 brake horse power at 2200 r.p.m.

Carbon dioxide gas is now being given the ultraviolet light treatment to make it more active. Bottled or mixed drinks containing the ray-bombarded gas are more sparkling, "zippier," and healthier.

When typing on continuous forms, ingenious new device attachable to any typewriter automatically moves back set of page size carbons as each section is finished, eliminating need for continuous carbons, and giving perfect alignment.

In new public address system, the microphone unit can be plugged in anywhere in the building, and the program picked up on any radio set in the same building. No wiring is needed between microphone and speaker, the voice or music being transmitted over the electric lighting system.

Bedside hoist trolley enables even heaviest of invalids to be easily and comfortably lifted high above bed while linen is being changed.

Editor's Note—Addresses of manufacturers of these and other new products in this issue can be obtained by sending stamped, addressed envelope to MODERN MECHANIX AND INVENTIONS. *Manufacturers are invited to submit photos and literature for this page.*